iConstruct™
FOR AUTODESK™ NAVISWORKS™

iConstruct 2015
User Guide

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1 Overview

iConstruct is an application developed by industry professionals for industry professionals which capitalises on advantages provided through Building Information Modelling and Information Management

Utilising Autodesk's Navisworks software and its powerful collaboration and review technology, iConstruct provides additional tool sets to project teams and consultants to manage construction information to suit requirements for various segments of the industry, from design engineers to construction managers, and integrate this intelligence into a single 3D model displayed in Navisworks.

Utilising a range of data management tools, iConstruct provides the ability to configure and manage the information from various consultants design models in Navisworks and additional data required from external sources into a simplified and formatted display to suit the end user. This allows design teams and consultants to provide better communication on design intent and construction methodology to onsite construction teams throughout the project.

Using the formatted and standardised data within these models, iConstruct's extended range of additional tool sets allow users to extract information that is required at different stages in the construction process. This readily available information allows for better planning and well informed decisions. The information can also be extracted from the model and presented through a variety of customisable reporting tools, which can then be disseminated and distributed to relevant stakeholders.

1.1 History

The iConstruct software was developed by industry professionals over the past several years to meet the growing need of information required to be delivered on various construction projects. The requirements for these projects all shared a similar problem; to provide standardised and co-ordinated data from a range of multiple CAD and design platforms and different internal databases.

To meet these requirements, iConstruct tools were paired with the power of Autodesk Navisworks technology, which helped design teams and other construction professionals overcome these outstanding problems. Autodesk Navisworks was chosen as the review platform due to its advanced technology to collaborate and handle larger CAD models which met the scope of these projects. With the support for a large number of native CAD formats, Autodesk Navisworks also allowed design teams to keep working in their current design package and still meet the standardised information requirements.

Since its initial development iConstruct has grown to provide consultants and construction professionals with a wide range of reporting, data configuration and query tool sets so information can be collected where and when needed without needing to search for it, increasing the efficiency and effectiveness of individuals and teams. In turn this has provided cost and time savings to teams on active projects.

The future of iConstruct is focused towards supporting BIM based design and to develop tools that further improve the efficiency and effectiveness of its users, by leveraging of relevant, accessible and standardised project information, productive reporting and enhanced communication tools.

1.2 What's New in 2015?

iConstruct's development team have been spending some time consolidating and improving our line-up of tools, in addition to this there are some key new modules for this release.

New to the iConstruct line-up are:

Licensing System

We have chosen a new licensing system from WIBU that will better meet our customers' requirements in the future. This release is the changeover to the new system, and in coming releases we will have features such as license borrowing which has been a request from many of our users.

Dynamic Labeller Module

First making its debut as a beta module in the service release, the Dynamic Labeller Module is now official, allowing for users to quickly add property labels to the view and optionally save as a Navisworks redline marked up viewpoint.

Smart BCF Exchange Module

The BCF Exchange module allows Navisworks viewpoints and comments to be exported to and imported from the BuildingSMART BCF format.

Some of the enhancements to existing modules:

- BIM-Flow
  - Stability improvements
  - Extra activities added
  - Scheduler added when using server
- Smart DWG exporter
  - Improvements to preserve model structure
  - Handles more complex models
- Clash Manager
  - Stability improvements
  - Proximity grouping feature added
  - Export visible columns to excel option added
  - UI improvements
  - Auto-create saved viewpoints option
  - Rename group/renumber groups option
- Export Data
  - Ability to link datalinker template with report
- Laserpoint Creator
  - Improved UI
- Export Clash View Report
  - Export clash views per group
  - Speed improvement when using locator views
- ReConstruct
  - Ability to add/remove/hide properties in exported model
  - Linework support added
  - Revit collection support
  - Ability to define default layer/group names for ungrouped/unlayered items
  - Merging of contents of blocks and inserts
- Smart IFC exporter
  - Improved geometry handling particularly with piping

2 Installation

When installing iConstruct for the first time, make sure to install the latest relevant release of iConstruct that is suitable to run on whatever release of Autodesk Navisworks that is installed. Before installation make sure all Navisworks programs are closed.

2.1 Prerequisites

Before installing iConstruct 2015 make sure all older versions of iConstruct are first uninstalled from the Navisworks versions currently installed. iConstruct 2014 can be run on Navisworks 2014 and iConstruct 2015 on Navisworks 2015 on the same computer, but iConstruct 2014 and 2015 cannot run on the same version of Navisworks.

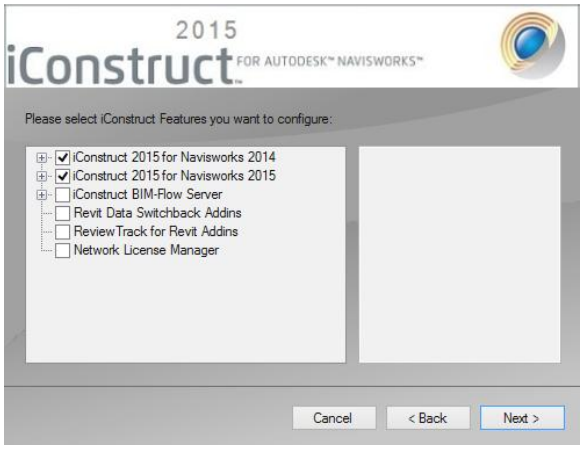
These pre-requisites must also be installed and configured properly on the computer that iConstruct is to be installed:

- Autodesk Navisworks 2015 Simulate or Manage, or Autodesk Navisworks 2014 Simulate or Manage
- Microsoft .NET Frameworks 4.5
- MS Access Database Engine or Microsoft Office (64 bit)

2.2 Running the Installer

The user running initial setup should have local administrator rights. Right click the 'setup.exe' icon and click 'Run As Administrator', the Welcome dialog will appear, click 'Next', and the feature selection (below right) will appear.

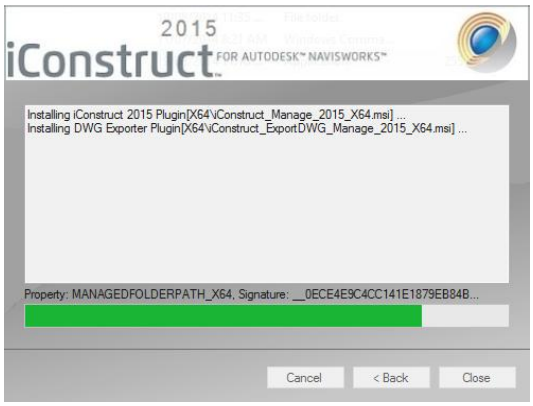
2015
iConstruct FOR AUTODESK™ NAVISWORKS™
The installer will guide you through the steps required to install iConstruct 2015 for Autodesk Navisworks on your computer.
WARNING: This computer program is protected by copyright law and international treaties. Unauthorized duplication or distribution of this program, or any portion of it, may result in severe civil or criminal penalties, and will be prosecuted to the maximum extent possible under the law.
Cancel
< Back
Next >



By default the installer detects the available versions of Navisworks and automatically ticks those features to be installed. iConstruct Server Service and Revit Data Switchback Addins are features that are not required for the general function of iConstruct and should be ticked only if the user is familiar with them. Please consult chapters 21 & 22 for further information regarding these features.

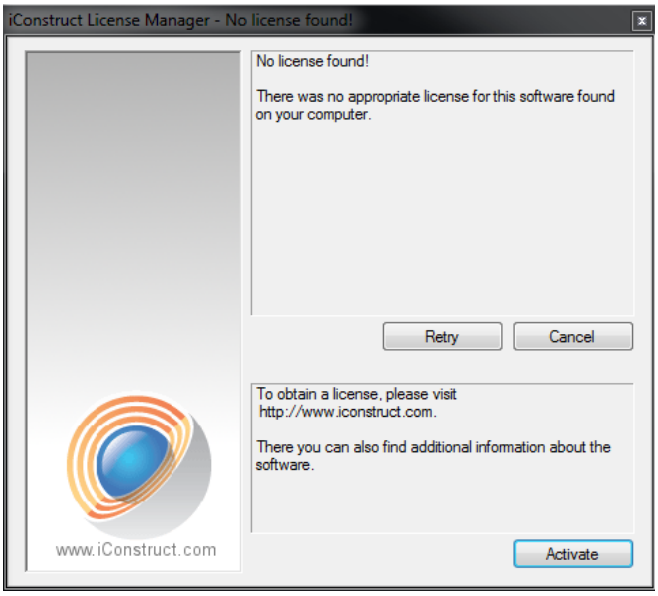
Once the Feature selection is complete, click ‘Next’. The installer will prompt for an optional server name or IP address of an existing iConstruct server. This can be left blank if no server is available. Click ‘Next’ again and then ‘Finish’ to start the installation process.

2015
iConstruct FOR AUTODESK NAVISWORKS
Please specify the name or IP address of the iConstruct 2015 Server :
Note: If you do not have iConstruct 2015 Server setup in your network, or the server is not yet installed, you can ignore this page by pressing Next.
Server Name or IP Address:
Please use Windows Update to check for any critical updates to the .NET Framework.
Cancel
< Back
Next >



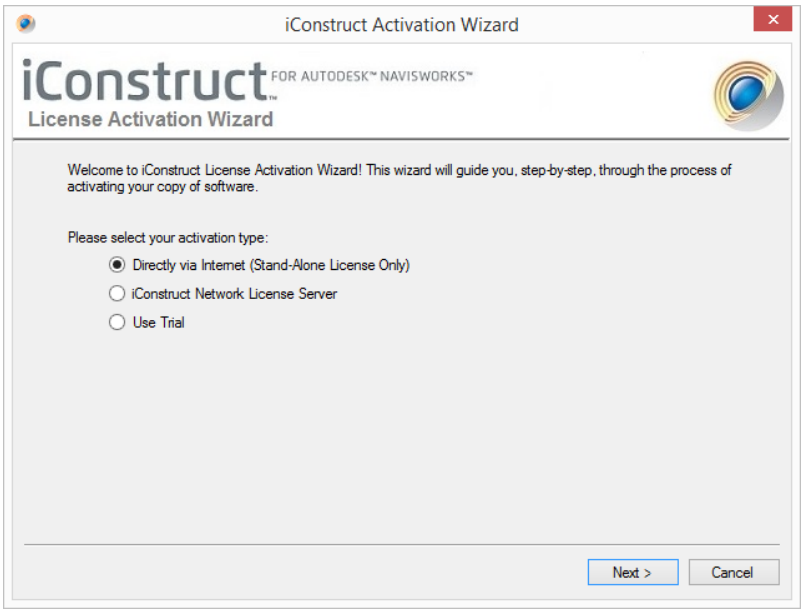
2.3 Licensing and Registration

The iConstruct Toolset requires user registration in order to activate the product. When iConstruct is executed for the first time, the user is prompted to activate the product via the dialog below.


iConstruct License Manager - No license found!
No license found!
There was no appropriate license for this software found on your computer.
Retry
Cancel
To obtain a license, please visit http://www.iconstruct.com.
There you can also find additional information about the software.
www.iConstruct.com
Activate

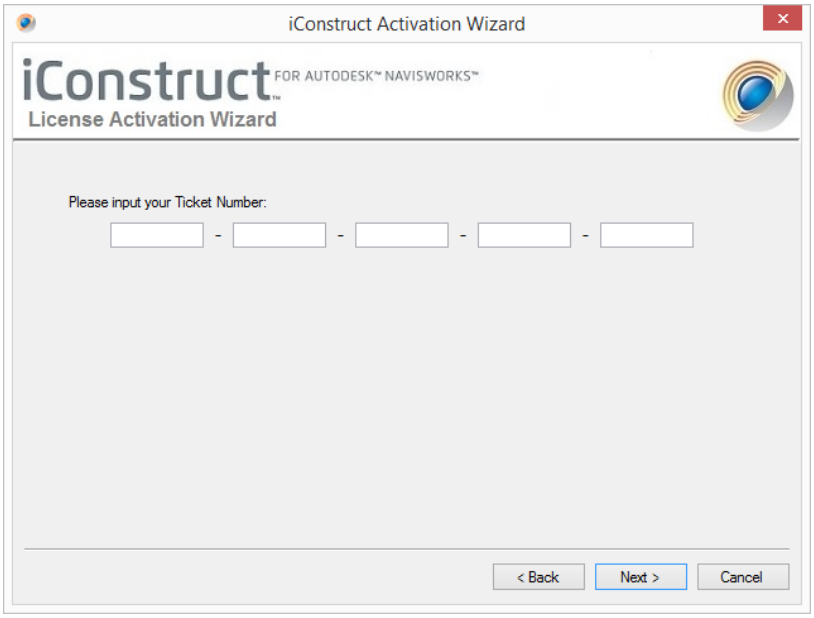
The iConstruct Toolset can operate in one of three activation methods:

- **Standalone License**: A standalone licence will issue the user with a licence to operate the Toolset on the PC to which the licence was requested.
- **Enterprise or Floating License**: An enterprise or floating licence is network based, and allows users to push and pull licences from a network pool.
- **Trial License**: A standalone license with expiration time (usually 30 days).


iConstruct Activation Wizard
iConstruct FOR AUTODESK™ NAVISWORKS™
License Activation Wizard
Welcome to iConstruct License Activation Wizard! This wizard will guide you, step-by-step, through the process of activating your copy of software.
Please select your activation type:
Directly via Internet (Stand-Alone License Only)
iConstruct Network License Server
Use Trial
Next >
Cancel

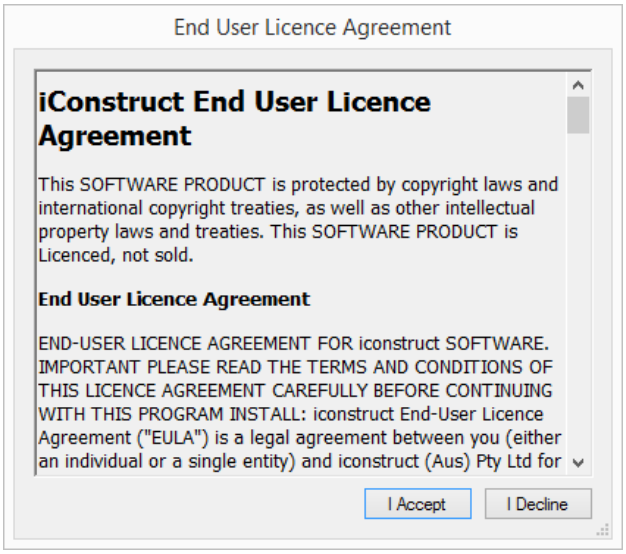
2.3.1 Standalone License Activation

To activate a standalone copy of iConstruct select the 'Directly via Internet' option and press 'Next'. An iConstruct Activation Code will need to be input in the available text boxes and press 'Next':



Please make sure that an active connection to the internet is available at this time. The activation wizard contacts the online activation server and installs the iConstruct License on the machine.

The End User Licence Agreement (EULA) will need to be read through and accepted in order to activate the software.


End User Licence Agreement
iConstruct End User Licence Agreement
This SOFTWARE PRODUCT is protected by copyright laws and international copyright treaties, as well as other intellectual property laws and treaties. This SOFTWARE PRODUCT is Licenced, not sold.
End User Licence Agreement
END-USER LICENCE AGREEMENT FOR iconstruct SOFTWARE. IMPORTANT PLEASE READ THE TERMS AND CONDITIONS OF THIS LICENCE AGREEMENT CAREFULLY BEFORE CONTINUING WITH THIS PROGRAM INSTALL: iconstruct End-User Licence Agreement ("EULA") is a legal agreement between you (either an individual or a single entity) and iconstruct (Aus) Pty Ltd for
I Accept
I Decline

A message box will appear at the end of the process stating that the activation has finished successfully. After closing this message box iConstruct will automatically start.

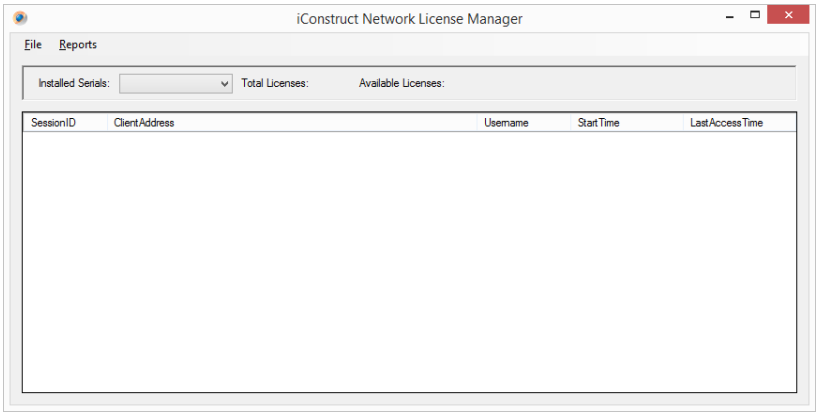
2.3.2 Floating Network License Activation

In order to use iConstruct in a floating license environment, a license server will need to be installed and activated. To install iConstruct License Server, CodeMeter Runtime Kit will need to be installed on the users license Server.

2.3.2.1 System Requirements for iConstruct Network License Manager

The iConstruct Network License Manager is part of the iConstruct setup, so you only need to select a computer on your network that will act as a network server. To set up an iConstruct Network server as following:

- a computer with a network connection
- the computer needs to have internet connectivity for the initial activation of the license
- The iConstruct Network License Manager needs to be installed



There is no need for a server level operating system for the iConstruct Network License server. Any computer that has recent Windows or OS X versions is capable to act as a iConstruct Network License server. (Windows XP, Vista, 7) Even one of the workstations can work as an iConstruct Network License server.

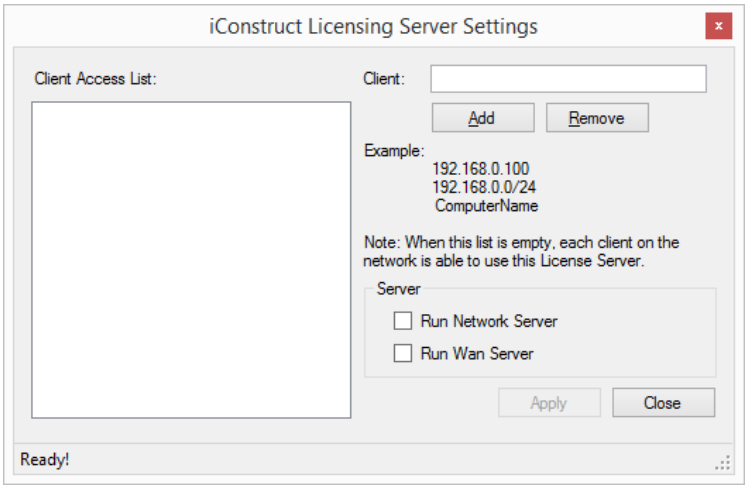
2.3.2.2 Activating License on the Server

- Install iConstruct Network License Manager on the License Server
- Run 'iConstruct Network License Manager' from start menu > iConstruct 2015 folder
- Select 'Activate License' from File menu
- Select the Directly via Internet (Stand-Alone License / Network License Server)
- Input your Network License Activation Code
- Follow the wizard to activate license

2.3.2.3 Set up the Server

After you have your server running and licensed you can enable license sharing following these steps:

- In iConstruct Network License Manager run 'Settings' from the 'File' menu:



To enable the Network server:

- Check **Run Network Server** checkbox
- Do not forget to *Apply the changes*
- Make sure your clients have access to this port

2.3.2.4 Access Control

With the default settings all computers on the same local network (same subnet) may use a license from the server. In case the access needs to be restricted:

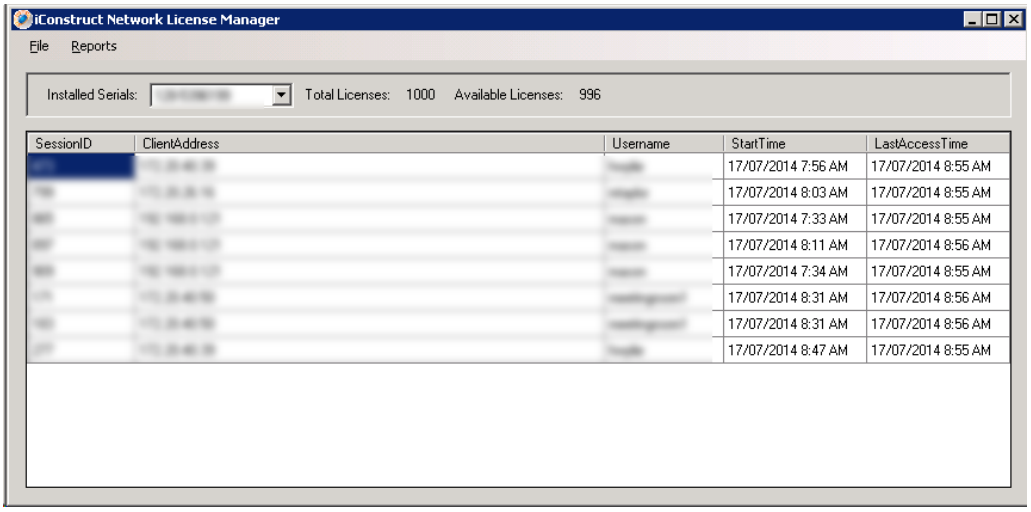
- Open Settings
- Add IP address / range or computer name you want to grant access to the license server

Anyone on the local network can use a license unless entries are specified in the clients list, in which case access is restricted to only those clients.

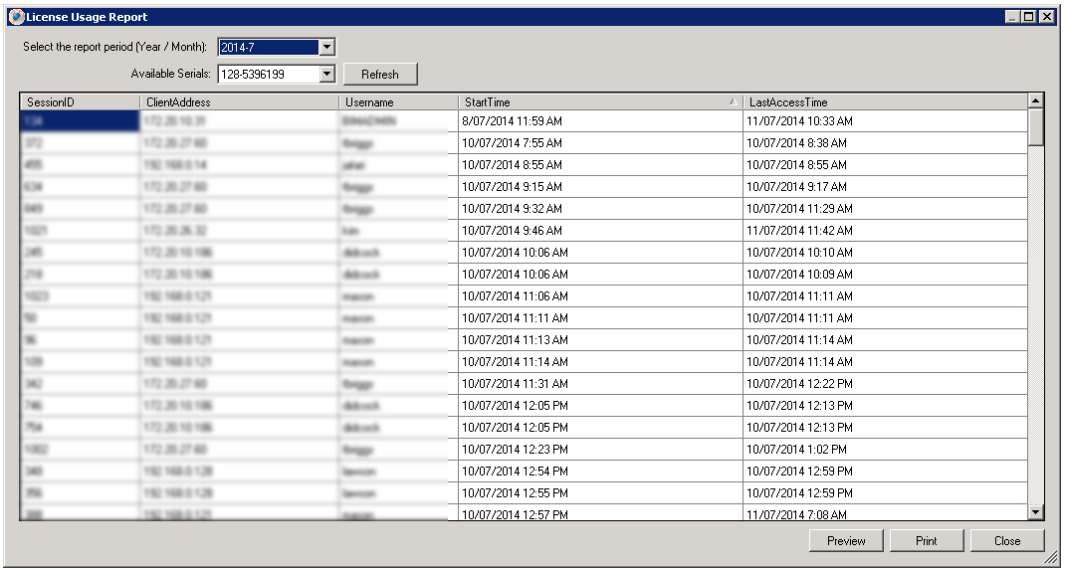
If the server is public on the Internet or licenses are to be restricted, make sure that this list is filled correctly to avoid unwanted license usage.

You may want to check who is using a license:

- Open iConstruct Network License Manager on the license server computer
- The main window will show you the list of currently connected clients:

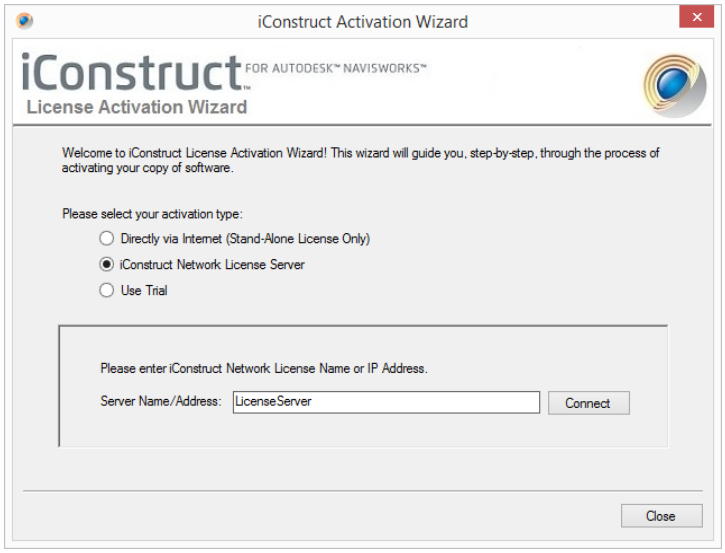


Also you can get monthly reports of the license usage from ‘Reports’ menu:



2.3.2.4.1 Client Side Settings

To activate iConstruct on a client using a network floating license select 'iConstruct Network License Server' while activating the client for the first time:


iConstruct Activation Wizard
iConstruct FOR AUTODESK™ NAVISWORKS™
License Activation Wizard
Welcome to iConstruct License Activation Wizard! This wizard will guide you, step-by-step, through the process of activating your copy of software.
Please select your activation type:
Directly via Internet (Stand-Alone License Only)
iConstruct Network License Server
Use Trial
Please enter iConstruct Network License Name or IP Address.
Server Name/Address:
LicenseServer
Connect
Close

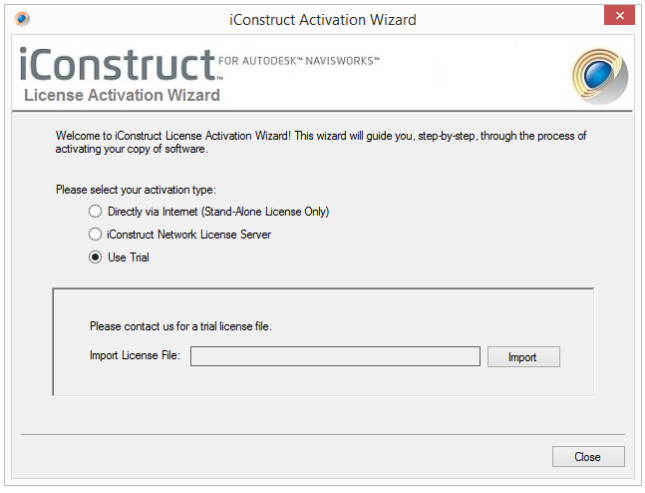
Input the name or IP address of the license server that has been setup in the previous steps then press connect.

After accepting the License Agreement the wizard connects to the server and activates iConstruct using the network license server. iConstruct will start working after activation is complete.

2.3.3 Trial Activation

To activate iConstruct using a trial license contact an iConstruct dealer to obtain a trial license file. This trial license file can only be activated on the machine once and will expire on an exact date and time.

To activate the trial license select 'Use Trial' option in the activation wizard form and then choose the location of the trial license file.


iConstruct Activation Wizard
iConstruct FOR AUTODESK™ NAVISWORKS™
License Activation Wizard
Welcome to iConstruct License Activation Wizard! This wizard will guide you, step-by-step, through the process of activating your copy of software.
Please select your activation type:
Directly via Internet (Stand-Alone License Only)
iConstruct Network License Server
Use Trial
Please contact us for a trial license file.
Import License File:
Import
Close

After the license file has been imported and the software license agreement has been accepted the trial license will be imported and iConstruct will be activated.

2.4 Plug-Ins

iConstruct can run custom plug-ins developed using iConstruct APIs to increase its integration with the users company's needs and requirements. Please contact the distributor for further details.

3 Concept

There are a few concepts that iConstruct is based around, that once understood may benefit the end user in getting the most out of iConstruct.

3.1 Read only Tabs

Navisworks models exported from Native CAD packages or loaded from the Native Files contain only read-only data tabs. This is also true of datatools tabs – the data can be refreshed from the datasource but the user cannot change the value of a property.

3.2 Hidden Tabs

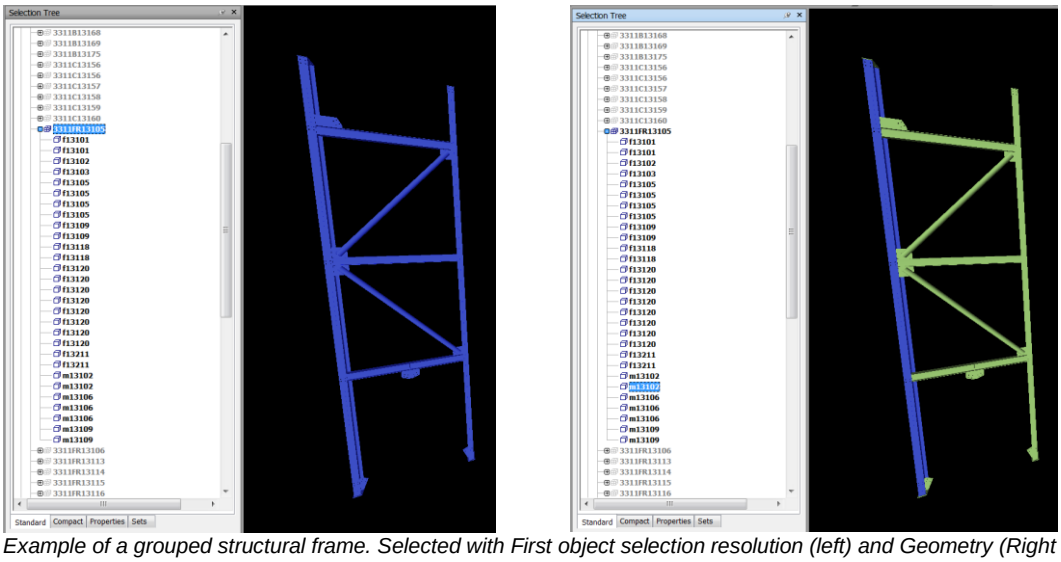
Hidden tabs are also known as developer tabs – they are a method for writing data to a Navisworks object (usually by way of a custom exporter) but without it cluttering the data tab window unnecessarily. These tabs are still accessible through the iConstruct dialogs but not visible to the user unless 'Show internal properties' is ticked in Global Options->Interface->Developer

3.3 Writeable Tabs

Writeable tabs are how iConstruct stores linked data within the Navisworks model. Generally the process starts with Integrator, copying key properties from read-only tabs into a newly created, writeable one that can be updated from several sources as well as manually appended. Currently iConstruct only supports one writeable tab per object, and it is highly recommended they be named the same across a project/company.

3.4 Groups vs. Items – Modelling Hierarchy

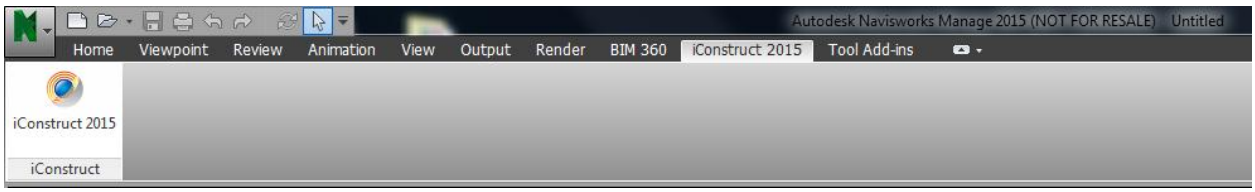
To get the most out of iConstruct in terms of speed of processing, it is recommended that items in models be grouped to minimize the number of items that need to be involved during processing. For example if the user are working on structural steel it is advised all the piece items are grouped by the assembly, or in piping the components grouped by line number. This means that for the vast majority of colour codes / datalinks there is much less processing required. Using selection resolution (First Object for Groups, Geometry for Parts) allows the user to easily switch between the two. ReConstruct can be of assistance in getting the model hierarchy organised correctly.



Example of a grouped structural frame. Selected with First object selection resolution (left) and Geometry (Right

4 First Look

iConstruct embeds into Navisworks as an add-in module. To open the iConstruct application, select the iConstruct icon from the iConstruct 2015 menu inside Autodesk Navisworks when using the Standard Interface.



When the application opens, there is an option to pin the toolbar open and or dock into the side control bars of Autodesk Navisworks. If the user closes the iConstruct window they will need to re-open it through the Tools menu. Note that when the iConstruct window is closed it will remember its position and size the next time the application is launched.

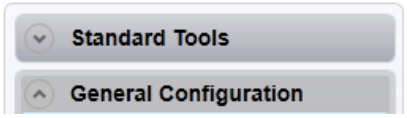
4.1 Panel Lathe usert

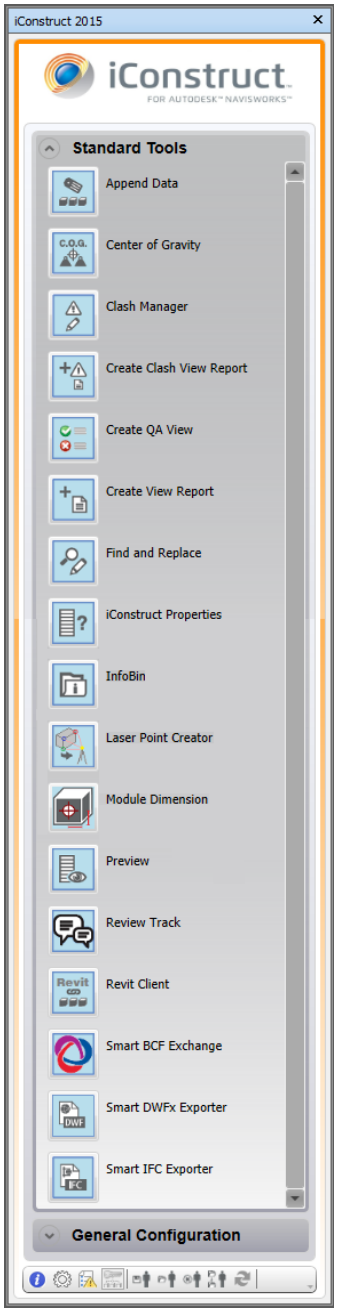
The user interface sits within the Navisworks application with the user having the ability to dock or float the iConstruct window like other Autodesk Navisworks Tools. On first run, iConstruct will open in a docked position. To make the most of iConstruct's intuitive button bar control, it is highly recommended to use iConstruct as a floating window so that it can be moved around the main workspace or onto a user's dual screen.

iConstruct's panel could be merged or docked with other Navisworks panels together to make it more convenient for the user to manage the work place. iConstruct is designed so that existing Navisworks users find it easier to become familiar with the interface while they are using it with other Navisworks tools.

4.2 Standard Tools vs. Configuration-based templates

The iConstruct Menu organises the different toolset commands and settings to allow easier location and identification by the user. Select these menu titles when accessing their relevant tool commands or settings.



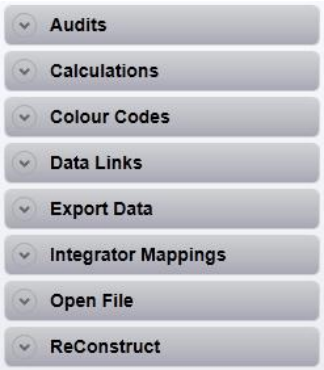


By default, at the beginning of the project/profile setup, iConstruct will only begin with two menus. These include '**Standard Tools**' and '**Configuration**'. The Standard Tools Menu contains a range of iConstruct tools that are either configured through '**General Configuration**' or do not require any configuration at all. This range of Commands located under the Standard Tools Menu includes:

- Append Data
- Center of Gravity
- Clash Manager (*Manage Only)
- Create Clash View Report (*Manage Only)
- Create QA View
- Create View Report
- Find and Replace
- iConstruct Properties
- Info Bin
- Laser Point Creator
- Module Dimension
- Preview
- ReviewTrack™
- Revit Client
- Smart BCF Exchange
- Smart DWFx Exporter
- Smart IFC Exporter

These tools will always remain under this Menu whether they require initial configuration or not.

Once additional tools have been configured and commands established, new menus will appear for these relevant tools in which they will be grouped under their associated functionality.



Note: Menus that are made available to other users can be altered using iConstruct's security settings.

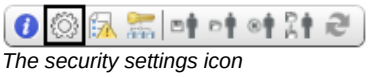
Under each menu there are commands that will perform the functions that have been setup through the configuration settings. The commands listed are the results of templates created and saved under the configuration menu.

To remove commands from the associated command menu, the user will need to delete this template from the configuration menu.

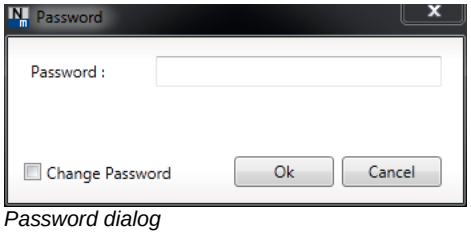
4.3 Security

iConstruct's toolsets and configuration menus that are available to users can be customised and saved to a user's profile using iConstruct's security option. This enables management to control and monitor which toolsets are available to the users. To begin the customisation of a selected profile, the approved user/administrator will need to click on the toolbar at the bottom of the main iConstruct window and click the '**Security Settings**' icon (see below). This will then prompt the user with a dialogue box to set a password to protect the customisation that is about to be made.

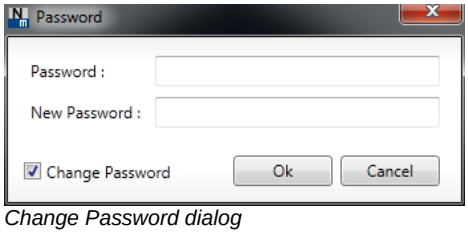
Note: If the password needs to be changed, check the box change password. The old password will need to be entered before the new one is accepted.



The security settings icon

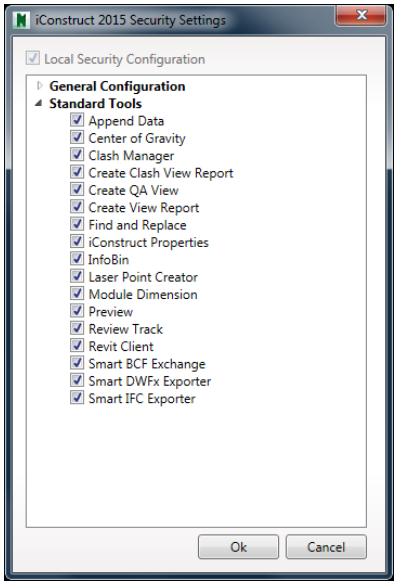


Password dialog



Change Password dialog

After a password has been established, the iConstruct security option menu will appear. Users/administrators, will then be able to select which tools and configuration settings are made available to users of that profile.



Amendments can be made at any time by entering the established password when prompted, making the necessary changes and clicking '**OK'**.

4.4 Profiles

A profile stores all the settings and configuration that has been done on all the toolsets and templates inside of iConstruct, which then can be passed onto other users without having to replicate the same configuration work. This allows management/consultants to establish customised profiles to suit organisational, team, or project standards.

There are four options available for profile management:

- **Save Profile**: When selected will open a '**Save As**' dialogue box allowing the user to create a new profile or override/update existing. All configurations and amendments made will be saved or updated to the new or existing profile.
Note: security passwords that are active will be saved to the profile.

- **Load Profile**: Allows the user to open previously saved profiles and import all the settings and configurations associated to that profile. When a profile is loaded any existing profiles that are open will close.

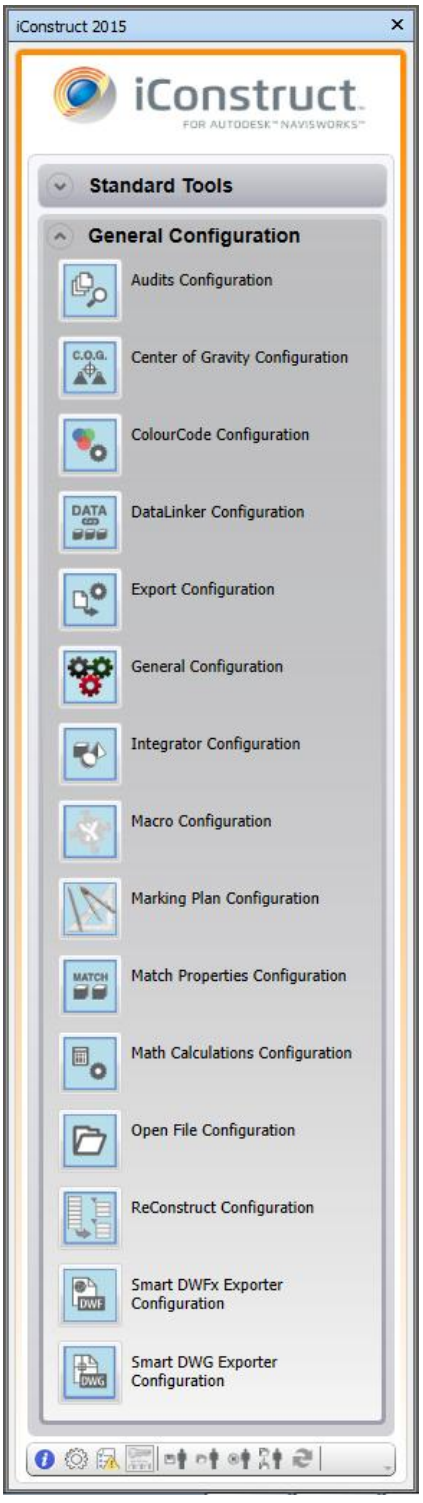
- **Clear Profile**: Closes the current profile and restores iConstruct to its default state. Clear profile should be selected when the user wants to create a new user profile from scratch to avoid editing or overriding existing profiles.

- **Merge Profile**: Allows templates from other profiles to be added to the current profile (see chapter 25)

4.5 Re-Launch iConstruct

Click the Re-Launch button to restart iConstruct (this will re-read the license information).

4.6 Configuring iConstruct



Audits Configuration: Define search sets to be audited or set up to auto-filter by a property.

Center of Gravity Configuration: Sets the mass property to use for density calculations, as well as selecting an indicator icon for the COG result.

Colour Code Configuration: Set up for running colour codes using Excel spreadsheets, Access, or ODBC data sources.

DataLinker Configuration: Stamps data into a writable tab in the Navisworks model from Excel, Access, or any ODBC data sources.

Export Configuration: Used for defining templates for exporting data to Access databases, Excel files or PDF reports.

General Configuration: Sets the default properties / other configurable items for iConstruct.

Integrator Configuration: Defines the data from various property tabs that will be brought into the company or project defined property tab.

Macro Configuration: Used for loading an XAML file created with the workflow designer into the iConstruct panel as a new command button.

Select Similar Configuration: Define attributes and properties to be selected by common values.

Math Calculations Configuration: Define calculations to perform on selected items.

Open File Configuration: Links Navisworks properties with existing documents or PDF files.

ReConstruct Configuration: Choose the setting for re-exporting models or part thereof to a new nwd, optimally reorganising the model hierarchy.

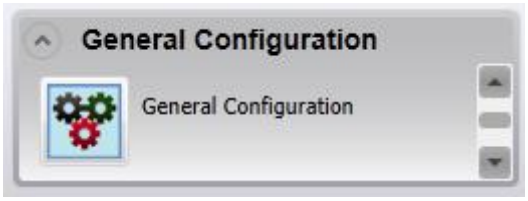
Review Track Configuration: Configure the back-end database to store viewpoint and comments data, as well as nominate custom fields.

Smart DWFx Exporter Configuration: Sets the model name and the data tab to use when exporting to DWFx.

Smart DWG Exporter Configuration: Saves the options as templates for exporting Navisworks geometry as a DWG file.

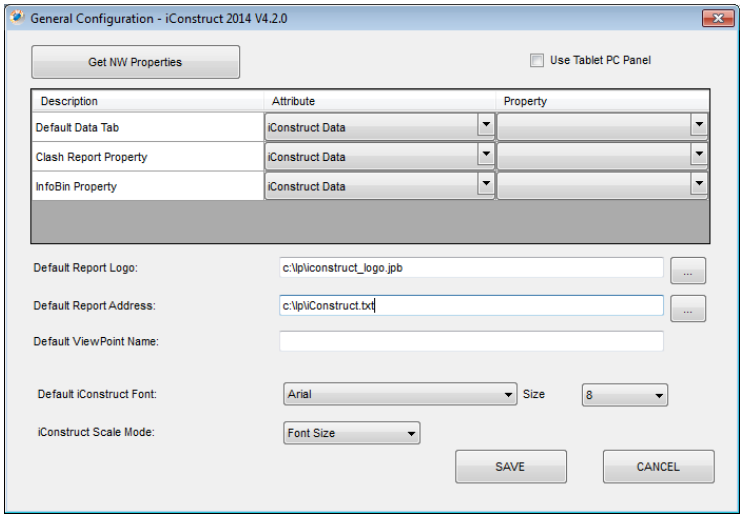
4.7 General Configuration

The '**General Configuration**' interacts with multiple toolsets and some of the default display settings.



After the user opens and begins to edit the '**General Configuration**', like with most of the other configuration options in iConstruct, the user should select a sample of objects in the model that represents the data/property names the user wishes to look for.

Selecting the entire model will provide access to all available data tabs and properties, but will take a lot longer than picking a few '**Typical**' items. Once a few items have been selected (or the entire model if desired), click on the '**Get NW Properties**' button.



This will then provide the user with some general configuration options, which may require an attribute and property for each option. These options include:

Default Data Tab: The default data tab to write data to when running commands through iConstruct. Please note the default data tab must be a writable tab. Only an Attribute value is required and no Property value.

Clash Report Property: The custom property the user wishes to have for each element in iConstruct's view report. This information could be internal data of the object or any external data that has been brought into the model through DataLink (see Clash Report). *Note this property is not required to be set and will be removed in future releases. It is included just for compatibility purposes.*

Info Bin Property: The property name used for Info Bin folders where drawings and other files are stored related to selected objects in the model. If an object is selected and the Info Bin icon pressed, it will search for the Info Bin folder associated with this defined property. If no Info Bin folder exists, iConstruct will prompt the user to create one.

The other general configuration options, that are not associated with the models attributes and properties, are the report settings. This includes:

Default Report Logo: allows users to import or select a company or project logo to display on iConstruct's report output as a default unless specified on other templates.

Default Report Address: allows users to enter a company address or custom text field to be displayed at the header of iConstruct's report output as a default unless specified on other templates.

Default iConstruct Font and Size: allows the user to choose the default font and size to be used in the iConstruct interface and dialogue boxes.

iConstruct Scale Mode: will determine whether the dialogue boxes and the text displayed are rescaled depending on the resolution settings. This option should be used if the users are having issues with the visibility of the dialogue boxes.

Note: By default this setting should be set to '**font**', and set to '**off**' if the user is having issues viewing the interface.

5 Integrator

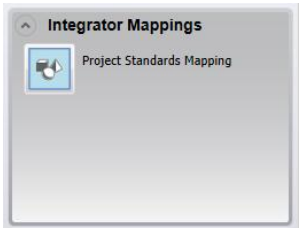
'Integrator' allows users to create the their own custom data tab within Navisworks and takes data from one or more read-only data tabs and combines them into a custom data tab. This is used in situations where companies may want standardisation of what data they want displayed when selecting an object in a model and or to reduce the hassle of having to look in different tabs and different properties for the required information.

Integrator is key to using iConstruct successfully as it takes the user from using read-only data in the models to being able to add data from several sources as the models are shared through the project.

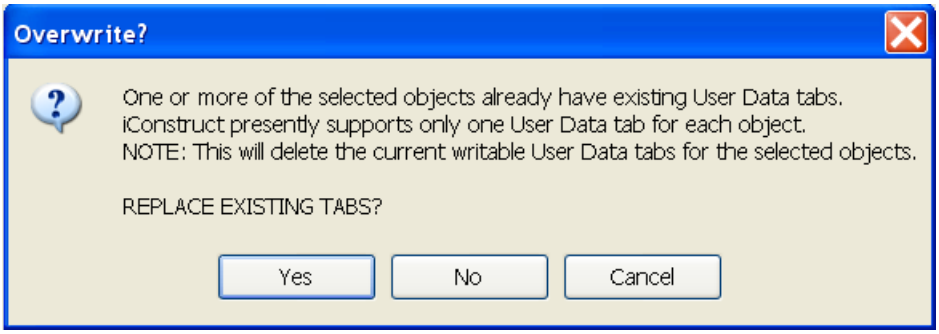
Note that only one user data tab is able to be created per object.

This could also be used at a project level where the user may be receiving models from different sources and need to set up a project or company specification based on standard required properties. The Integrator command provides the option to configure and create a user defined data tab for both Items and Groups within the Navisworks Model.

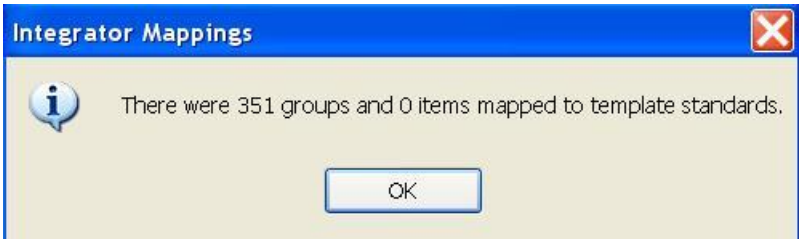
To map the standards that have been established in the templates in **'Integrator Configuration'**, select the **'Integrator Mappings'** to expand the menu.



To map the properties to a standard, select the relevant items and/or groups that are to be mapped and then select the Integrator Mappings command that was created when the template was saved. If the user has a pre-existing User Data Tabs, a prompt like this will appear.


Overwrite?
One or more of the selected objects already have existing User Data tabs.
iConstruct presently supports only one User Data tab for each object.
NOTE: This will delete the current writable User Data tabs for the selected objects.
REPLACE EXISTING TABS?
Yes
No
Cancel

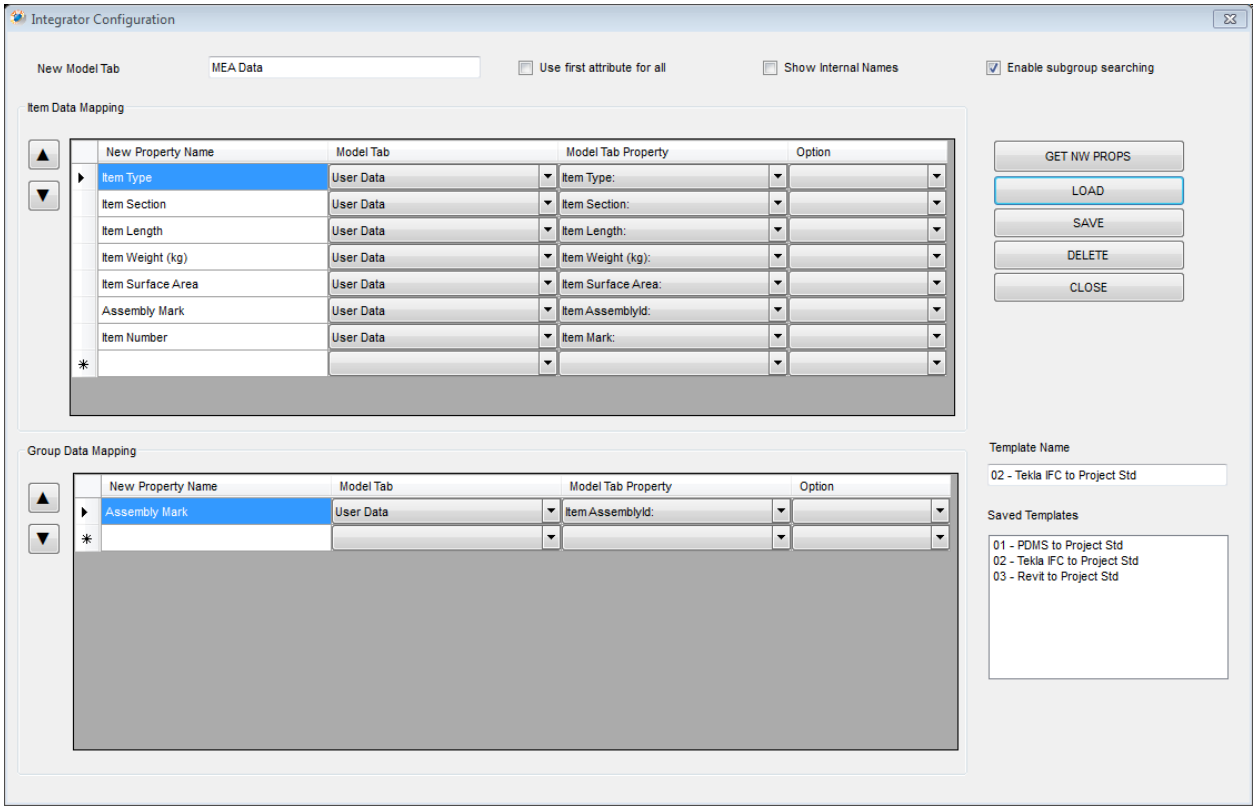
If the standards are mapped successfully, users will receive a similar success message;



The model will need to be saved in order for the mapped properties to remain within the model. If the model was not saved, the user can re-run the command at another time and then save the model in order to save the new User Data tab information.

5.1 Configuration

To begin the configuration the user will need to select a sample from the model, and then click the **'Integrator'** icon to open the Configuration window. Depending on whether the user is working with the Integrator on Items or Groups, they will need to make sure the sample that they have selected suits the level they are working on.



5.1.1 Configuration Window

There are a number of items on this configuration window that will make Integrator work;

Get NW Props: collects the data from the selected sample Item or Group data to be used in Integrator when setting up the custom data tabs.

Load: Load a saved Integrator Configuration template.

Save: Save the current configuration to a new template or update existing.

Delete: Delete a saved Integrator Configuration template.

Close: Closes the Integrator Configuration menu.

Template Name: The name to be assigned to or already assigned to the template.

Saved Templates: This is a list of the saved Integrator templates. When selected, these can be opened for editing and then resaved or deleted.

Data Tab Name: Will be the display name of the customised data tab inside of Navisworks when the **'Integrator'** command is run.

Use first attributes for all: If all the properties are from one tab the user can check the 'Use first attribute for all' tick box, which will make the attribute field the same as the first for the whole list.

Show Internal Names: If checked, it will display a read only column in the configuration grid of the internal property names of items selected within the model. This can be used if the user has renamed

the **'Standard Name'** in the configuration grid to a standard terminology, and still need to check what property it relates too.

Enable Subgroup Searching: looks at items within the group for properties that cannot be mapped on the group. For example if the user had no group data tab, but the items inside the group contained a property relevant to the group (i.e. Assembly Number), this option would find the first matching field within the group and use it instead.

5.1.2 The Item and Group Configuration Grid

After the sample properties have been retrieved from the model, the user can now begin to set up their custom user tab using Integrator's configuration grid. There are a number of columns in this section which will assist with the process;

New Property Name: The name that is given to the property inside of the custom user tab. This can be used to create a standardisation in terminologies for properties within models.

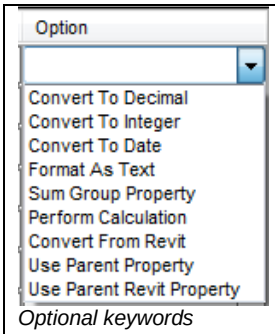
Model Tab: The internal Navisworks attribute that Integrator will be collecting the data from to include on the custom user tab.

Model Tab Property (Attribute): The internal Navisworks property that Integrator will be collecting the data from to include on the custom user tab.

Option: The optional conversion to use (see section 5.2)

Once a template has been saved an integrator command will appear in the **'Integrator Mappings'** menu.

5.2 Integrator Options



Optional keywords

There are a few conversions that can be used with Integrator to perform extra functions on the data as it is being transferred and therefore maximise efficiency as well as sanitise data.

In prior releases these conversions had to be typed in, but from 2014 onwards they are now available in an easy-to-use drop down list.

Convert To Decimal: Attempts to convert the property to a decimal number, stripping away any text from the property value. If the property cannot be converted to a number then the default '0' is used.

Convert To Integer: As above but converts to a whole number instead of a decimal

Convert To Date: Attempts to convert the value to a date format. Note that Navisworks does not currently support date formatting or time zone information so use this carefully.

Format As Text: Takes the existing value and converts it to text

Sum Group Property: Use with 'Enable subgroup searching' to add the item field as a total for the group node.

Perform Calculation: Displays the calculations stored in the profile for users to select to run when processing the property. Good for converting metric to imperial measurements.

Convert From Revit: Converts from the native Revit data type (volume, length etc) to a decimal number. Also removes any extraneous text from text fields.

Use Parent Property: When processing an item field, first looks in the parent node for the same field and uses that instead, like 'Enable Subgroup Searching' (see 5.3) in reverse except the parent property takes precedence. Useful when processing Revit models so all unique identifiers are at the same hierarchical level.

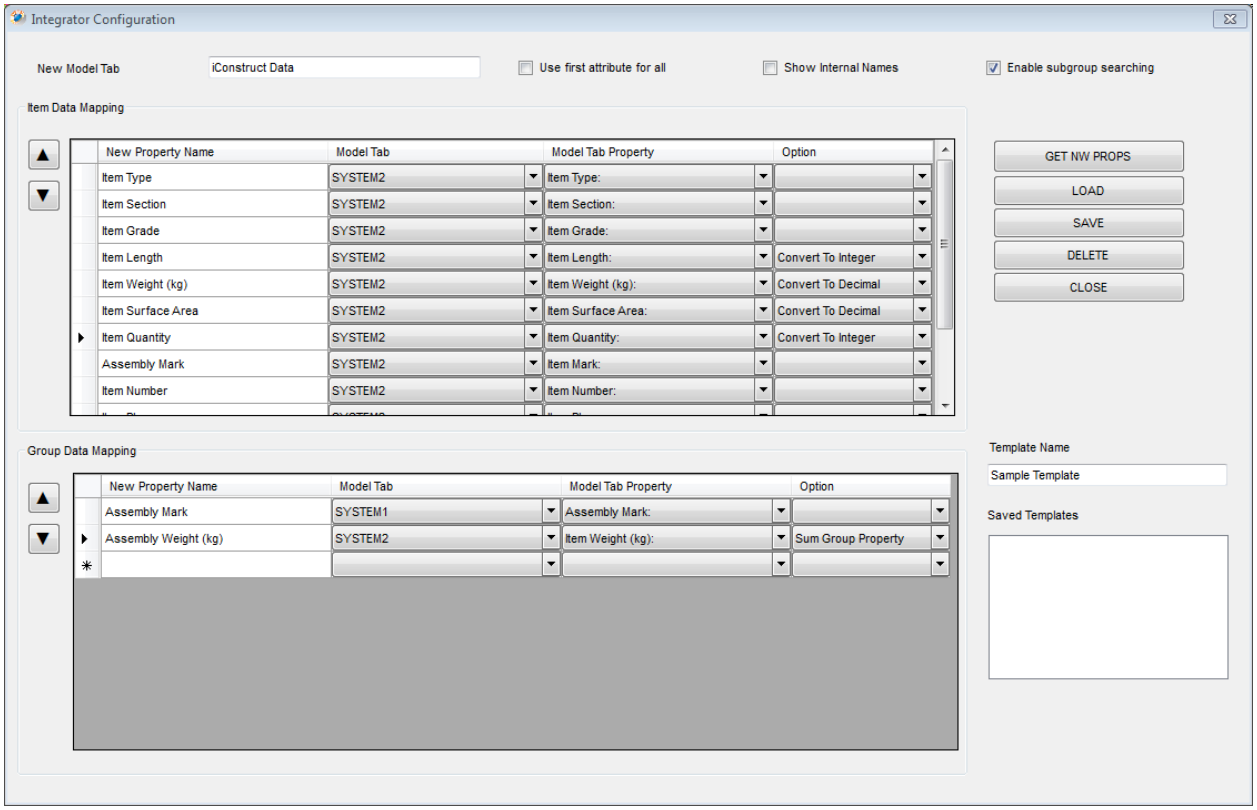
Use Parent Revit Property: Same as 'Use Parent Property' except 'Convert From Revit' is applied at the same time.

5.3 Subsearch – creates group tabs

By ticking the 'Enable Subgroup Searching' checkbox the routine will, in the case that data is not found on the group tab, pick the property data from the first object in the group. This is useful if a group tab has not been created by the native exporter and the user wishes to add an assembly mark, for instance. As mentioned above the SUM keyword can be used to sum a numeric property from all items in the group and place on the group tab.

5.4 Example

Below is an example Integrator template showing the data sanitation options ‘Convert To Integer’ and ‘Convert To Double’ in the ‘Item Data Mapping’ panel, and an example of creating a new Group Data tab by ticking ‘Enable subgroup searching’ and using the ‘Sum Group Property’ option to create an Assembly Weight (kg): field.



6 DataLink

The Datalink command provides users an easy to use interface with tools that allow bringing any external company and project data into a fully co-ordinated and collaborated model. With compatibility to XLS, MDB or ODBC Data Sources, companies can now further extend the amount of information included in a BIM Model inside of Autodesk Navisworks.

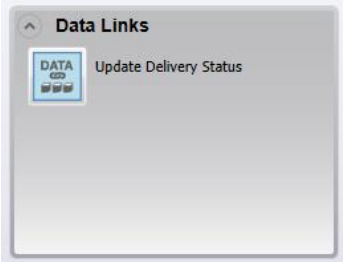
The external information and properties are then displayed in a user defined properties tab, which sits within the Navisworks interface. All fields within this properties tab are rewritable which provides the option to re-save or export back to the original data source via Excel or preferably MDB.

Important Note: If iConstruct is running on a 64 bit operating system, the 64 bit Microsoft ODBC drivers need to be installed. If any Office 32 bit components are installed on the machine it will need to be completely uninstalled and upgraded to 64 bit Office.

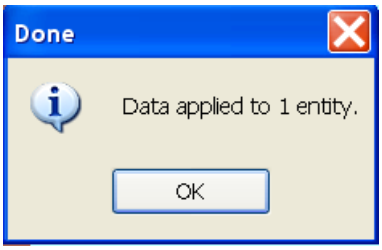
6.1 Concept

Data Link is a powerful tool that provides the ability to bring in related information from external data sources and be displayed within the Navisworks model. Once a link is established the data will save itself to a rewritable tab (see Integrator) that the user has set up. The Data Link configuration is best used by people with some knowledge of the database system, once set up however; it is simply a mouse click on the command to import the data into Navisworks.

Select the **'DataLinks'** tab to expand the menu to establish a connection through the commands created in the **'DataLink Configuration'**.



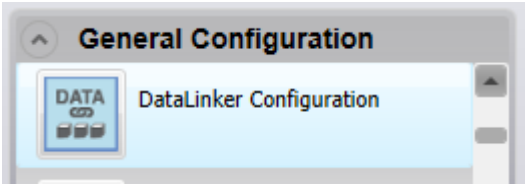
To establish a link and import the data from the external data source, select the associated items and/or groups that the data needs to be applied to and select the relevant command. If the data has been successfully applied to the defined properties tab, the user will receive the following confirmation message:



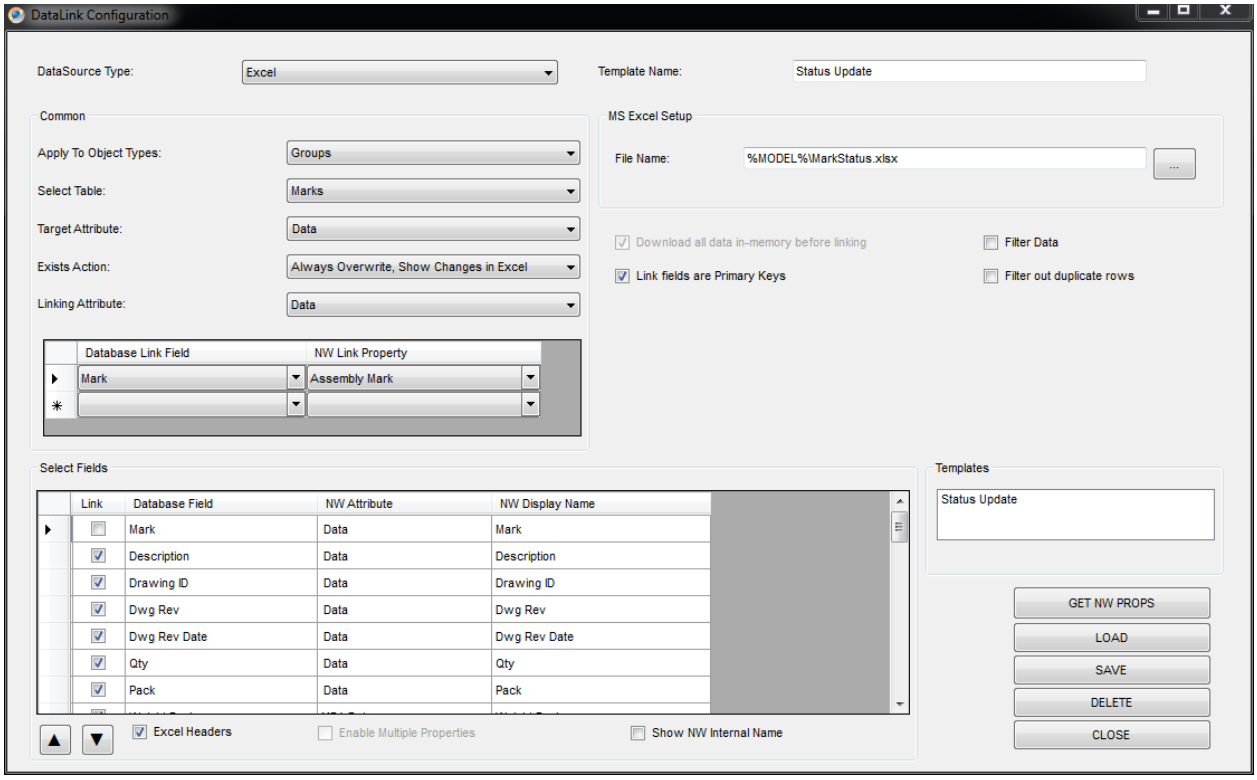
Note: The model will need to be saved for the DataLink data brought in from the external source to remain within the model. Updated data can be brought in by re-running the command on relevant objects.

6.2 Configuration

To begin the Data Link configuration users will need to select a sample from the model, and then open the Data Link Configuration window.



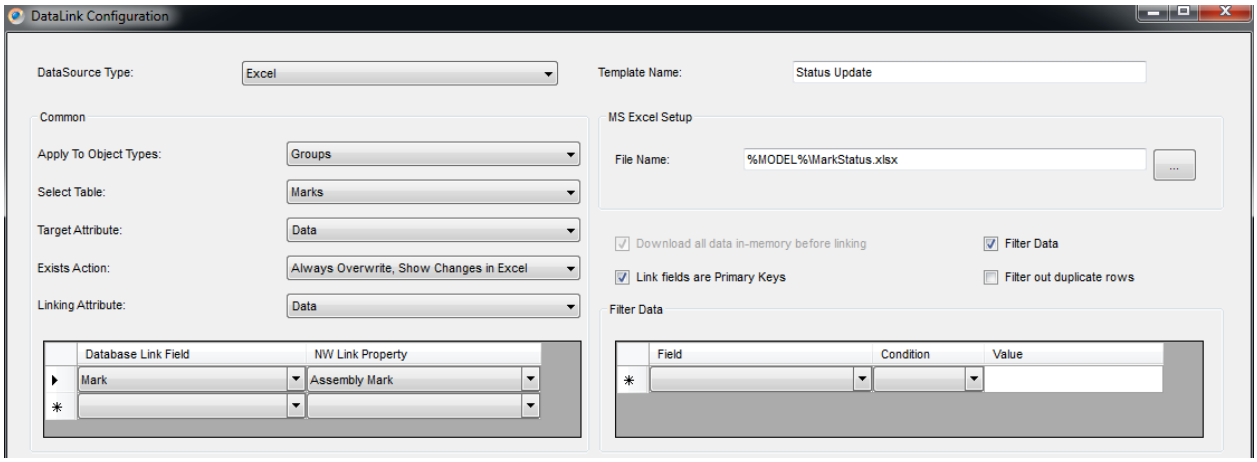
With the configuration window open and sample selected, users will need to select **'Get NW Props'** to identify the attributes and properties that the external data is going to be written to. The user will need to also identify the external data source that they wish to connect to, which can be chosen under the data source '**File Name**'.



Data Link supports links to Excel, MS Access and ODBC, with the method to configure Data Link for each being the same. For the link to work the user must have a unique property that exists in the Navisworks model that is able to match up with a similar property in the external data source in order to bring its associated data across into the right item or group.

6.2.1 The Link Setup

There are a number of areas on the Data Link Configuration that will help in setting up the link between the Navisworks model and the external data source;



Data Source Type: The external data source type to connect with. This can be Excel, MS Access or an ODBC data source type.

Template Name: The name that the DataLink template will be saved with and will be used in the command under the **'DataLinks'** menu.

Apply to Object Types: To determine whether the information will be applied to the Navisworks model's groups and/or items.

Select Table: The table from within the external data source that is to be drawn into the defined Navisworks properties tab.

Target Attribute: The attribute that Data Link will append the linked data to. Note that this tab doesn't need to exist in the model – DataLinker will automatically create a new tab in a similar fashion to Integrator. The 'Linking Attribute' must already exist on a read-only tab though.

Exists Action: Tells the DataLink command whether to overwrite the data or not when it is run. There are three options that can be selected: '**Don't Overwrite**', '**Prompt for Overwrite**', and '**Always Overwrite**'.

Linking Attribute: The attribute that Data Link will search within for the same value as in the external data source to create the link.

Database Link Field: The field within the table from the external data source that users wish to use as part of the link to the Navisworks model.

NW Link Property: The property field that the external data value will write too.

File Name: The name and option to select the external data source (Excel, MS Access or ODBC) in the link.

Filter Data: allows users to apply rules to control what information is brought in from the external data source with the Data Link tool. This is broken up by;

Field: the field from the external data source that the user is bringing into the Navisworks model's properties that they wish to filter.

Condition: the rule that the user wishes to apply to the filter, to control which information will be used. This can be an equal to, greater or less than, or like condition.

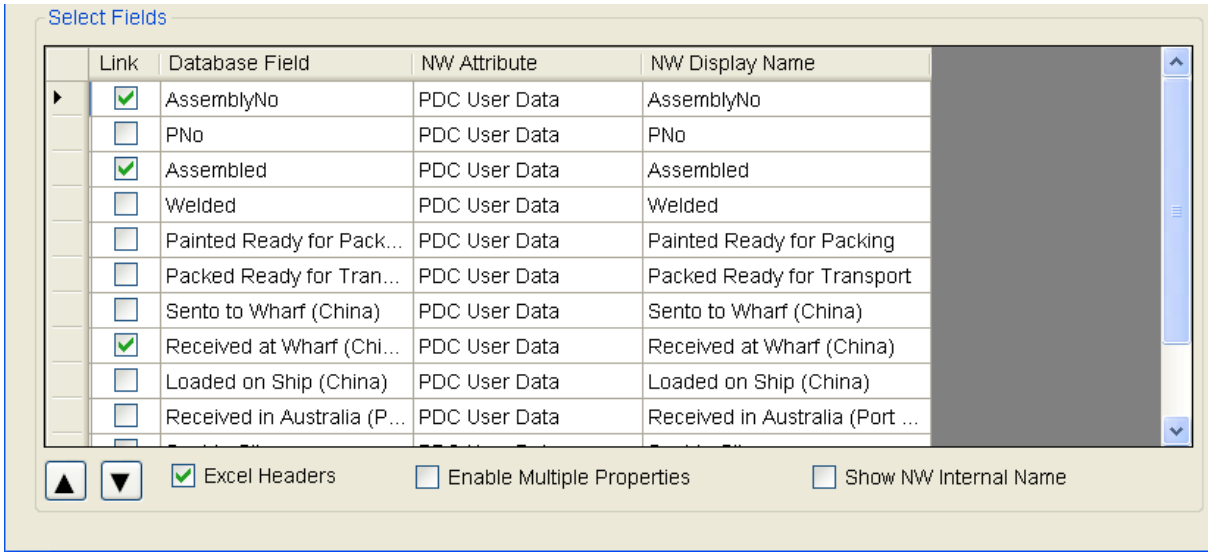
Value: the value that the user wishes to use as the benchmark or determining value for the condition applied.

Link Fields are Primary Keys: This is recommended if the link field or fields combined, is unique. It makes applying the data up to 60x faster in certain circumstances. The routine will warn if there are duplicates for the link field(s) and the primary key cannot be created.

Filter out duplicate rows: This is recommended for smaller data sets where there is a possibility of duplicate records. It improves the performance of the Datalink by removing duplicates and thereby reducing the number of records needing to be searched.

6.2.2 Data Import Configuration

Once the link is established users are then able to use the configuration grid to manage what data from the external source is brought in to their created properties tab in Navisworks.



The columns in this grid are used for:

Link: is used to select which external properties the user wishes to bring into the Navisworks user created properties tab.

Database Field: identifies the external field that the user is bringing in to the user created properties tab.

NW Attribute: the attribute (or user defined tab name) that the external information will be writing to.

NW Display Name: the display name of the property that will be created in the user defined data tab.

NW Internal Name: the internal name of the value, this internal name should match the project or company internal name for consistency of data throughout the model.

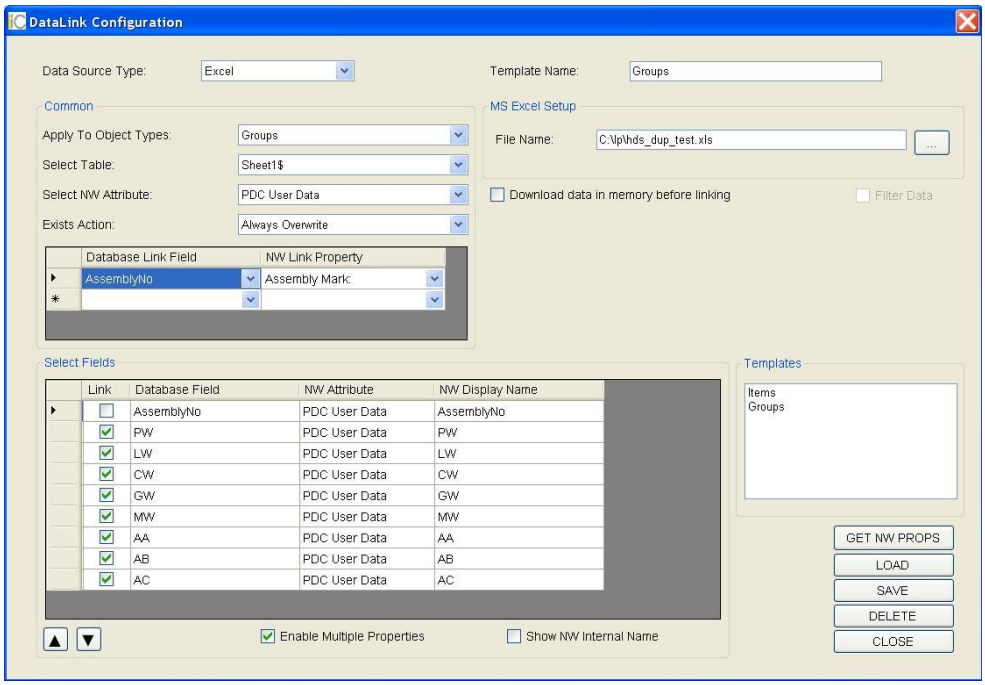
Excel Headers: look for headers in the Excel spreadsheet before reading the data.

Enable Multiple Properties: used if more than one record is returned from the Data Link. For example when multiple records are returned for 'Drawing', the properties would be applied as '**Drawing:**', '**Drawing2:**', '**Drawing3:**' etc.

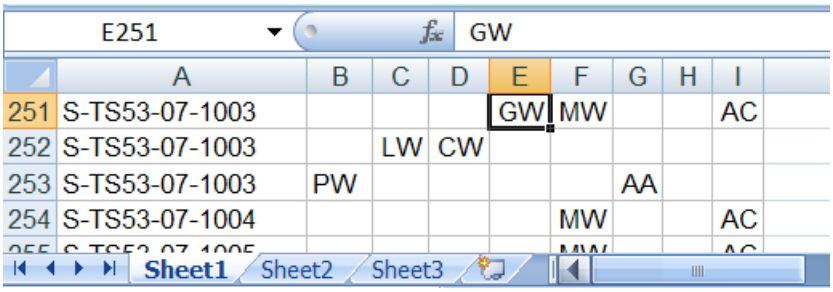
Show NW Internal Name: will enable and display the Navisworks internal property names in the configuration grid. This will assist if the user decides to change the display name and needs to make sure they know the internal Navisworks properties that it represents.

Note: when running the Data Link, data is only applied to the selection, or if nothing is selected, to everything in the model.

In the case that there may be several columns or fields that the user wishes to apply as a single property, ensure that the internal and display name for the required fields are the same for all. Only the first matched property will be applied. For example:

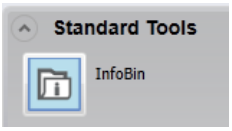


On row 251, GW is the first matched property for the Class name and will be applied. On row 252, LW is the first matched property while on row 253, PW will be applied.



Excel Spreadsheet

7 Info Bin



Info Bin links Navisworks model objects with a folder located in the model's directory. If the directory does not exist, the user is prompted with the option to create one. This provides construction professionals with a streamlined way of collating and organising relevant information against items within a model. This information could be anything from construction documentation, invoices, installation procedure etc. and can be added to at any stage during the construction or design process. Once information bins have been assigned, these can quickly be recovered so users can retrieve the relevant data located within these folders.

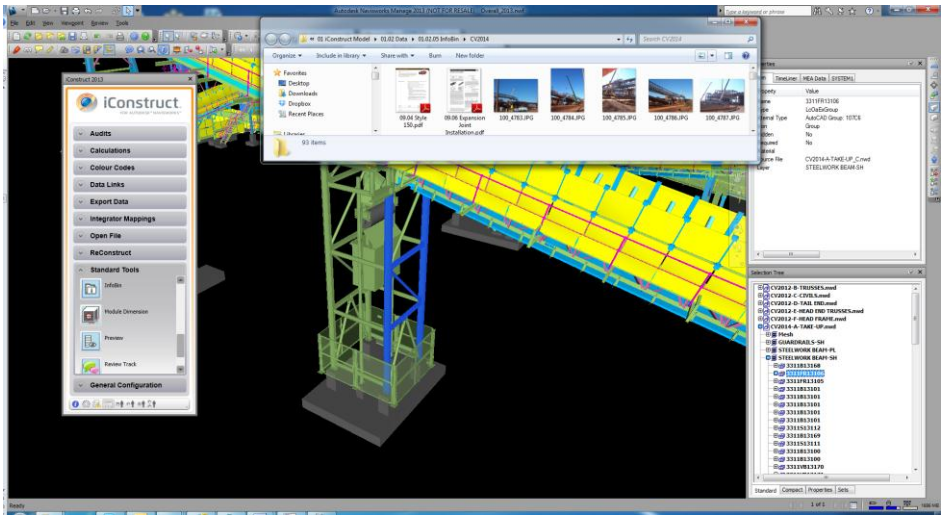
7.1 Configuration

Info Bin configuration is available from the '**General Configuration**' in configuration menu. The property name used for Info Bin folders where drawings and other files are stored related to selected objects in the model could be changed and configured from this panel.

By default the info bin folder is local to the selected item's model folder. To choose a new root folder, hold down the left shift key when clicking InfoBin to be prompted for a new location.

7.2 Example of use

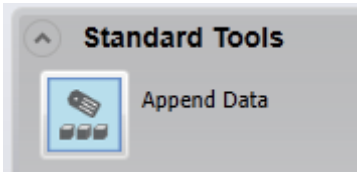
Below is an example of linking miscellaneous documents to the Assembly Mark of an object in a model.



8 Append Data

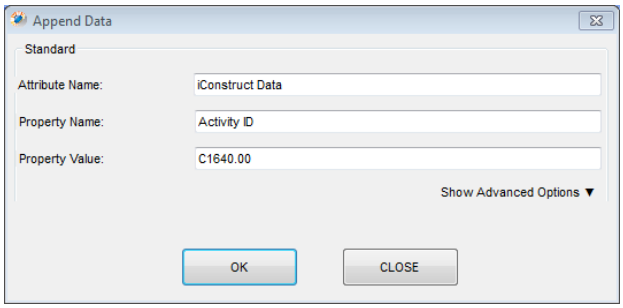
The Append Data Command is used to add, modify, or delete custom data to a selection within the model, to the Attribute name defined. This command can be useful for grouping items together or adding custom data on the fly.

From 2014 is the ability to save custom append data buttons to the main panel, for quickly adding data to items in the model. This is useful when using a model on a windows tablet on-site for example, for capturing the status of steelwork or other items.



To perform the Append Data Command, first highlight the items that are to have the data applied, and then click the **'Append Data'** icon. The append property dialog will be displayed in its default form. To add a property, enter the Property Name and the Property Value.

For use with the new custom append buttons, the user can also right-click in 'Property Value' to set the dates



8.1 Configuration

Select **'Show Advanced Options'** to show configuration options.

The fields on this advanced tab provide the user with the following options:

Internal Name: shows the '**Internal Name**' that will be used for the property (an important property if '**Create Tab if Non-Existent**' is checked).

Apply Property To: whether the property value will be applied to items, groups or both.

Property Type: the data type that will be displayed within the property. This can be set to text, whole number, decimal number, or date/time.

Exists Action: determines whether existing values are not overwritten, always overwritten, or the user is prompted (which provides the option to roll-back any changes being made).

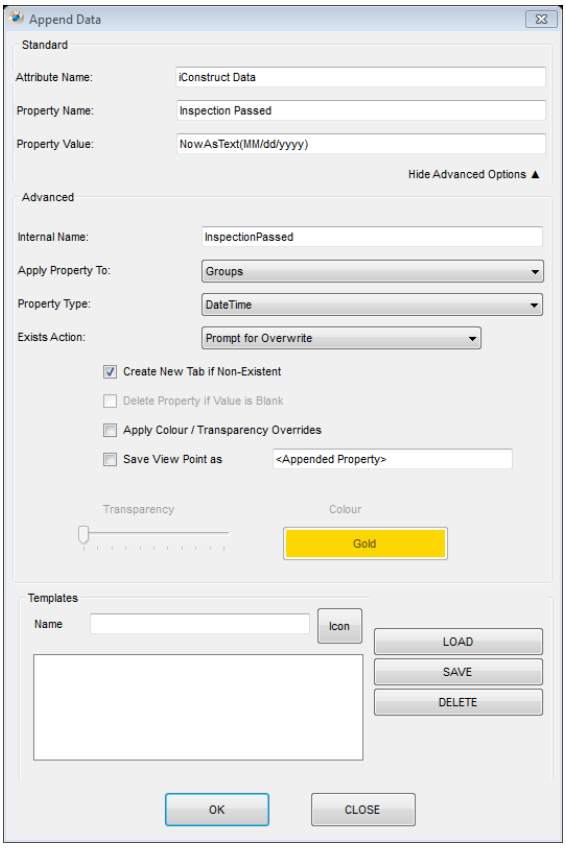
Property Value: add value here or right click for pre-set options

Create New Tab if Non-Existent: When checked it will create a new tab to append the data to if it does not exist on certain groups and/or items. This may occur when working from a collaborated model with multiple consultants' models.

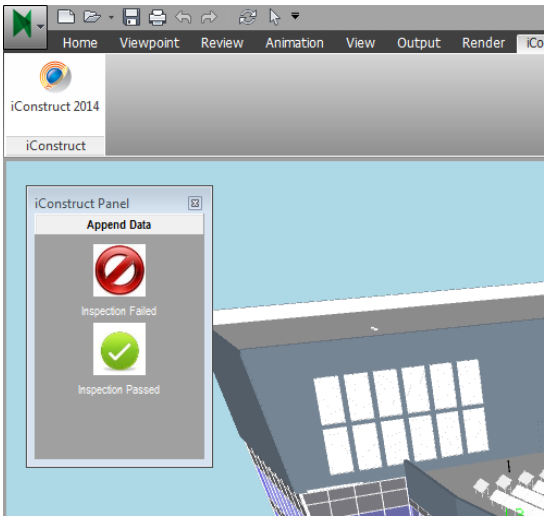
Delete Property if Value is Blank: When checked this will remove the property field from the selected items if the value has been left blank.

Apply Colour / Transparency Overrides: If checked, it will apply the selected colour and level of transparency to selected objects. This might be useful for grouping. Sliding the transparency to the left will make it opaque while sliding to the right will make the selected objects less visible.

Save View Point as: When ticked, uses the name in the text box to save the current viewpoint after applying data. Note that when this is ticked the user will be prompted for a comment also, just click ok to dismiss if no comment is required. This is handy in the instance that an item has failed some status and a note needs to be made.



Templates: Enter a template name, and click the icon button to select a custom icon for the template. When saved the append data commands will appear in a new 'Append Data' tab. This can the be dragged off the panel in Tablet UI mode (see later chapter) and used on a windows tablet pc for quickly checking off items.



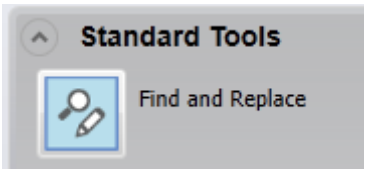
8.2 Use as a Workpacking Tool

The Append data tool can be used to assist in workpacking and attaching items to Timeliner by changing the 'Exists Action' to 'Auto-increment' (as shown). This in combination with the Audit module can quickly generate selection sets based on Activity / Workpack IDs and supports multiple IDs per item.

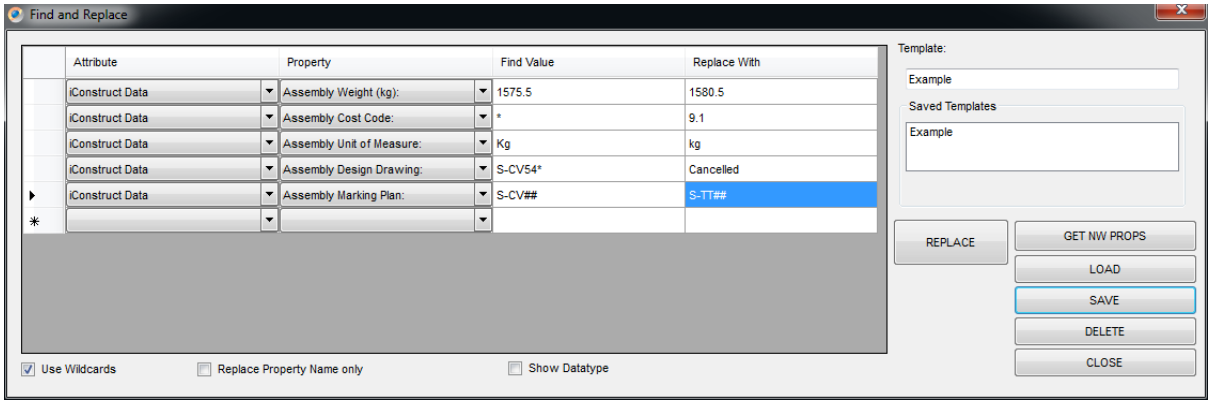
9 Find and Replace

Find and Replace functionality will allow users to edit and update model data when and where required. These tools will help improve quality and reliability of model data as changes can be made easily to keep all project information up to date.

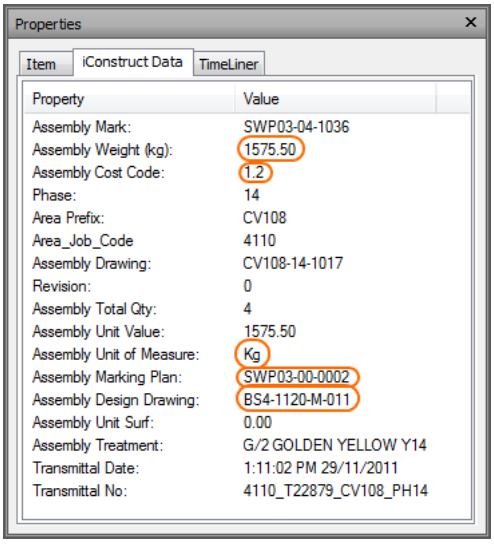
The primary use of this tool is to fix up the models temporarily so work related to the model can carry on while the native cad data is fixed up (i.e. spelling mistakes, incorrect codes etc.). It is not intended to be the final solution and any fixes done to a model should be considered short-term until the data source can be fixed up.

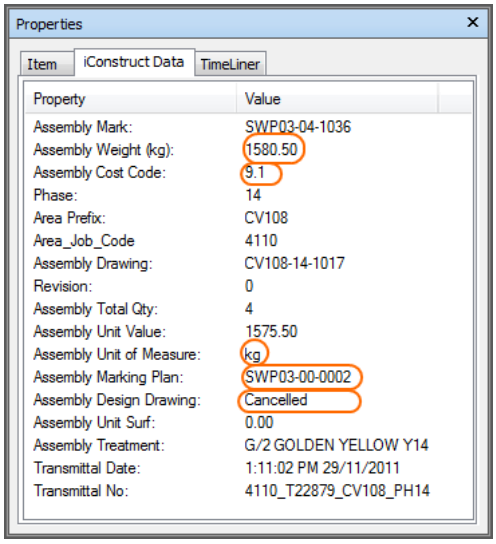


Select '**Get NW Props**' to get the properties of an object selected in the model. Specify the attributes, properties, values to find, and values to be replaced with.



Use wildcards like the hash key (#) to denote a numeric value that won't change. Use an asterisk (*) to find all values for that property to be replaced with a specific value. Press the Replace button and see the changes in the iConstruct Data properties tab.





9.1 Options

'**Find and Replace**' offers various combinations of property search. Users can set these combinations using onscreen configuration options:

Use Wildcards: Allows use of asterisks (*) to find any value for that property to be replaced. Also allows use of hash keys (#) to allow numeric values to be left unchanged.

Replace Property Name Only: The name and not the value of the property is replaced.

Show Datatype: After checking Show Datatype, select in the Datatype Column, text, whole number, decimal number, or datetime. Pressing the Replace button will convert this from the current datatype to the one selected.

10 Introduction to the Report Designer

The iConstruct Report Designer allows the user to create their own custom report templates to provide advanced and visually attractive report outputs. This will help the user with creating more meaningful and presentable reports to help support them during the decision making process on projects. The user can design their custom reports using Report Designer for exporting data (see 'Export Data' section), design report in View Report command (see 'View Report' section), or to customize a Clash View Report (see 'Clash View Report' section).

10.1 Report Designer Interface

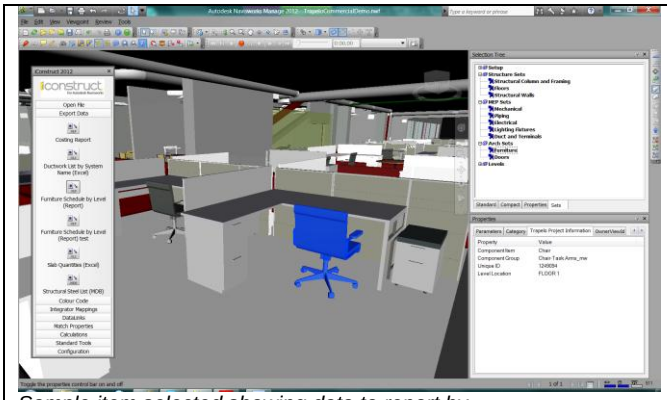
Report Designer form consists of several parts:

- **Main Menu**: Contains a set of items and sub items, which enable users to perform common actions over the report currently shown in the Design Panel. In general, it duplicates all the toolbar buttons available on the Main, Formatting and Layout toolbars. And, the Window menu allows disabling the tabbed multi-document interface, and tiling the Design Panel windows vertically or horizontally.
- **Toolbox**: Allows users to add controls to a report, by dragging and dropping their icons onto a report's area.
- **Report Explorer Panel**: Represents the visual tree of a report. It shows a report's structure in a tree form, and makes navigation through the report easy.
- **Field List Panel**: Shows the structure of a report's data source, and is used to bind report controls to data.
- **Property Grid Panel**: Used to access and modify properties of a report and all its elements (bands and controls).
- **Design Panel**: This is the Designer's main element, as it represents a surface where a report is being edited and previewed. The Design Panel has four tabs; (Designer, Preview, HTML View and Scripts), for report editing, previewing, and maintaining its scripts.
- **Component Tray**: Shows components (non-visual report helpers) related to report data binding. The user can click them to display and edit their settings using the Property Grid.
- **Group and Sort Panel**: Allows the user to quickly perform grouping and sorting operations throughout a report, and visually represents the report's grouping structure.
- **Toolbars**: Includes Main Toolbar, Formatting Toolbar, Layout Toolbar, and Zoom Toolbar; each represent all functionalities from main menu available in the fast and convenient way for designing the users report.

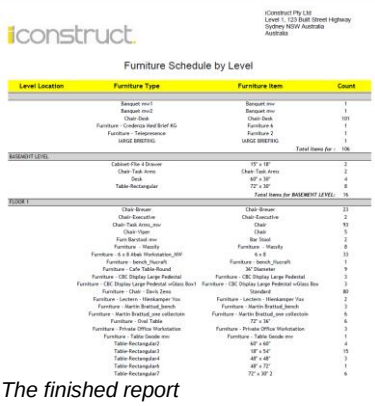
10.2 Basic Grouped Report – Example Walkthrough

The End User Report designer allows for grouping, sorting and using charts to be able to display model data concisely and accurately. As an example we will look at creating a basic multi-level grouped report. See 'Export Data' section for further information on creating a Report Template for use with the report designer.

In the example picture (below, right) of the model, an item of furniture is selected along with the relevant data tab showing the 'Component Item' and the 'Level Location'. These will be our main properties to group by to produce a report listing quantities of Furniture for each Level Location (see below, left).

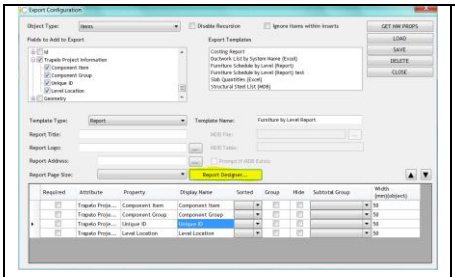


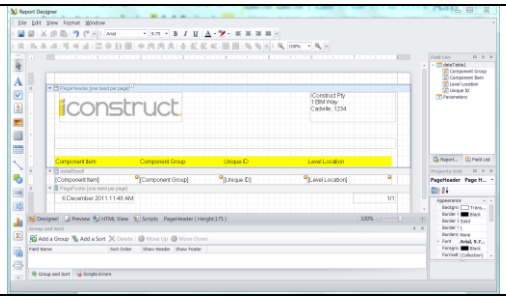
Sample item selected showing data to report by

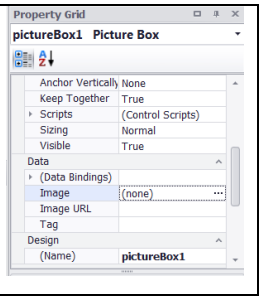


The finished report

Once the user has set up the report template (see 'Export Data' section), a large sample of data should be selected to give a good indication of report output, then click on the 'Report Designer' button (see below). The default report prototype will appear. To set the initial logo (if not selected in the Template editor) click the top left (Image) box, then click the 'Image' Property under 'Data' and select an image.

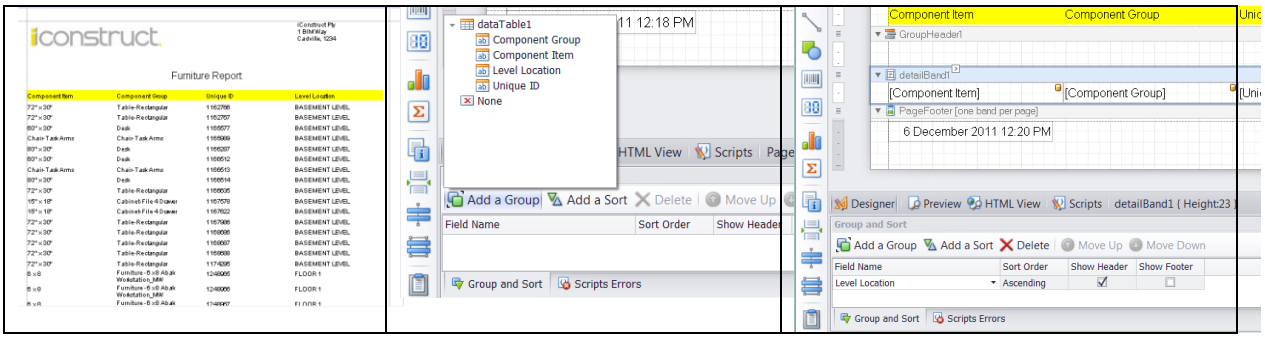






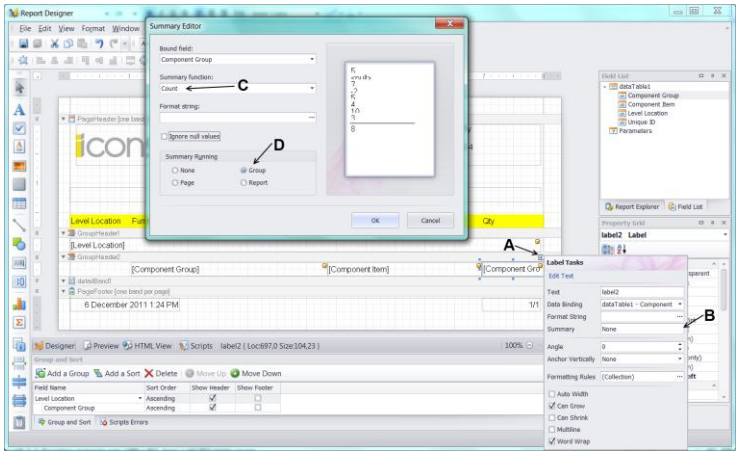
In its initial form, the report will just output each item as a separate row (see below, left). To add a group, or to sort by a specific field the 'Add a Group' or 'Add a Sort' buttons need to be used. When 'Add a Group' is clicked, a sub-menu showing the available fields to Group By is displayed, in this case 'Level Location' is clicked and the Grouping level is displayed.

At this time a 'GroupHeader1' band is also added to the report – this can be switched off/on or add a footer using the 'Show Header' or 'Show Footer' checkboxes. Note that the original fields are still all in the 'detailBand1'.

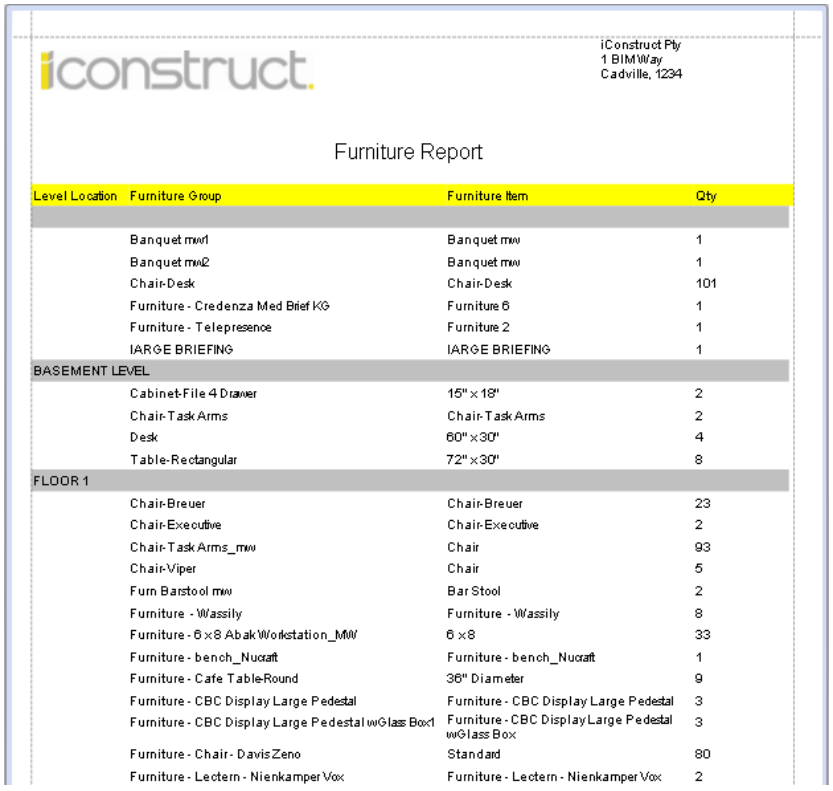


To create a group header, drag and drop the relevant header field from detailband into the group header (in this case 'Level Location'). This will group the report by Level Location (see below right), which is acceptable for some reports but in this case the report is to sum quantities by Furniture Group, so in this case an additional grouping level is added for 'Component Group' (below middle) and both fields are moved from 'detailband' to the new groupheader.

Also ‘Component Group’ is copied for us to change the ‘Sum’ field for. To sum by group, first click the field box then the > box that appears above it (A). Then click the Summary button (B) and the Summary Editor will appear. Change the ‘Summary Function’ to ‘Count’ (C) as the intent is number of (if for total mass SUM would be the chosen function). Finally set the summary per page, report or in this case Group (D).



And the final report, after minor formatting change to highlight the groups (select field and change the ‘Background Color’). Note this report picks up items not categorized by a Level Location, hence the empty first header row.



iconstruct

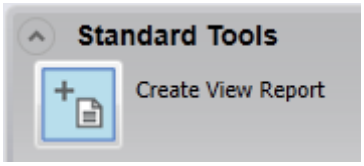
iConstruct Pty
1 BIM Way
Cadville, 1234

Furniture Report

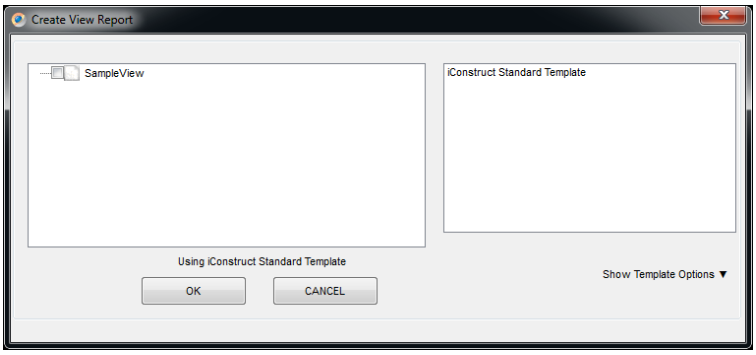
Level Location	Furniture Group	Furniture Item	Qty
	Banquet mw1	Banquet mw	1
	Banquet mw2	Banquet mw	1
	Chair-Desk	Chair-Desk	101
	Furniture - Credenza Med Brief KG	Furniture 6	1
	Furniture - Telepresence	Furniture 2	1
	IARGE BRIEFING	IARGE BRIEFING	1
BASEMENT LEVEL			
	Cabinet-File 4 Drawer	15" x 18"	2
	Chair-Task Arms	Chair-Task Arms	2
	Desk	60" x 30"	4
	Table-Rectangular	72" x 30"	8
FLOOR 1			
	Chair-Breuer	Chair-Breuer	23
	Chair-Executive	Chair-Executive	2
	Chair-Task Arms_mw	Chair	93
	Chair-Viper	Chair	5
	Furn Barstool mw	Bar Stool	2
	Furniture - Wassily	Furniture - Wassily	8
	Furniture - 6 x 8 Abak Workstation_MW	6 x 8	33
	Furniture - bench_Nucraft	Furniture - bench_Nucraft	1
	Furniture - Cafe Table-Round	36" Diameter	9
	Furniture - CBC Display Large Pedestal	Furniture - CBC Display Large Pedestal	3
	Furniture - CBC Display Large Pedestal wGlass Box1	Furniture - CBC Display Large Pedestal wGlass Box	3
	Furniture - Chair - Davis Zeno	Standard	80
	Furniture - Lectern - Nienkamper Vox	Furniture - Lectern - Nienkamper Vox	2

11 View Report

The **'Create View Report'** command allow the user to produce a report from the saved viewpoints associated with the Navisworks Model, along with any attached comment information created in Navisworks, and a space for written remarks. The View Report will also display the default logo and address (see **'General Configuration'** section).



To run the command, select the Create View Report icon and the **'Create View Report'** dialog will appear. Check the views that are required for the report and click ok. The report will then be displayed in the sample viewer, where it can be saved out as a PDF or Excel file.



'Create View Report' templates can also be used to modify how reports are displayed by clicking **'Show Template Options'**. Report logos and company address files can be selected for display along the header.

If **'Use as Default Report'** is checked, this template will become the default '**Create View Report'** template instead of the **iConstruct Standard Template**.

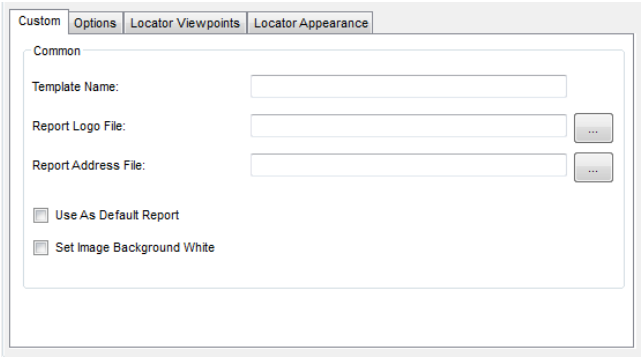
'Set Image Background White' optionally changes the background to white before creating the views, handy for generating reports to be printed.

'Template Name' is the name of the Template to save as.

'Report Logo File' nominates the logo to use on this template

'Report Address File' nominates the default address to use on this template. Note both Logo and Address files can be manually added/changed by using the 'Report Designer'

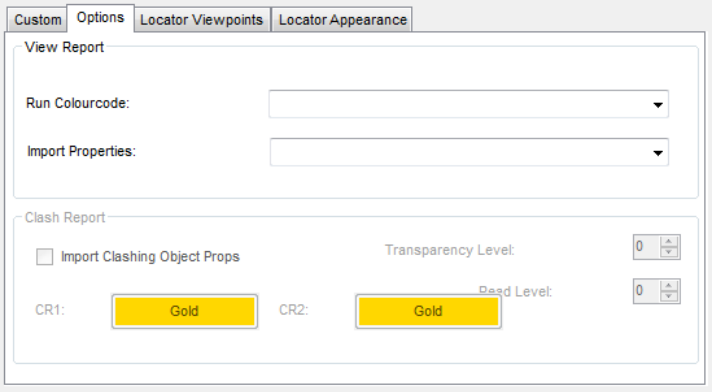
Click the **'Report Designer'** button to edit the layout of the report directly (see 'Introduction to the Report Designer' section).



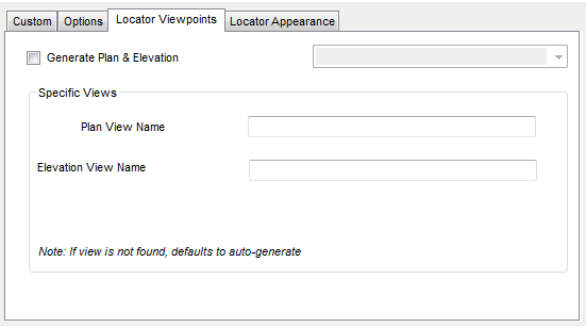
When the 'Options' tab is selected there are some additional settings:

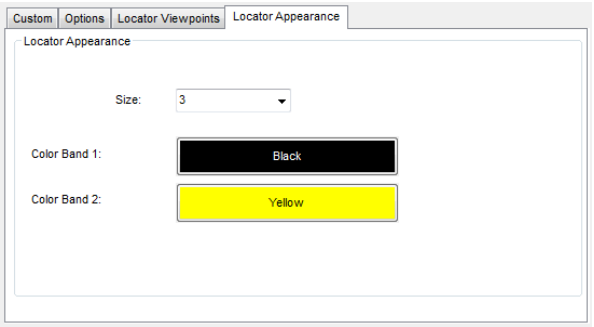
'Run Colourcode' nominates a saved colourcode to run prior to generating the view report – this is especially handy for producing status reports. Enabling this option also adds a legend panel to each view.

'Import Properties' reads all associated properties from the visible objects of each view – note that the data is for all the objects across all views. For producing view-dependant tables use the 'Insert Table' function.



'Locator Viewpoints' and **'Locator Appearance'**

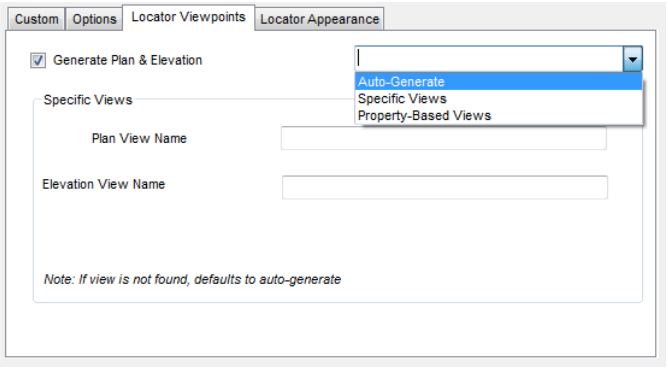


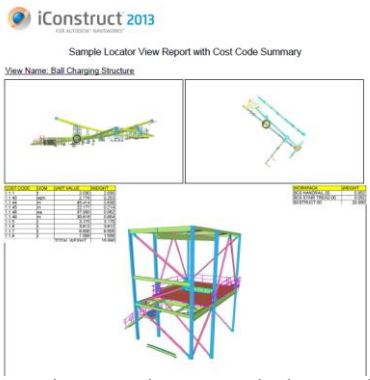


If 'Generate Plan & Elevation' is checked before running the reports, iConstruct will try to determine where the viewpoint camera is focused, and draw a circle around the area in a plan and elevation viewpoint.

There are 3 modes for generating the locator viewpoint:

1. Auto-Generate – Unhides everything in the model and automatically generates a plan and elevation view of the entire model. On very large models this may take some time.
2. Specific Views – The user can nominate a standard plan & elevation view. For large models this is preferable as the user can hide bolts, plates etc and leave only large concrete slabs and other relevant identifying geometry, speeding up the locator view generation process.
3. Property-based views – This is handy if, for example the viewpoints are part of a multi-story building – the user could assign a property i.e. Floor 1, Floor 2 etc to the items and then when the viewpoint is created, the property is read from the visible items and the first matching viewpoint selected. This way a sectioned viewpoint can be made per-level to improve visibility.





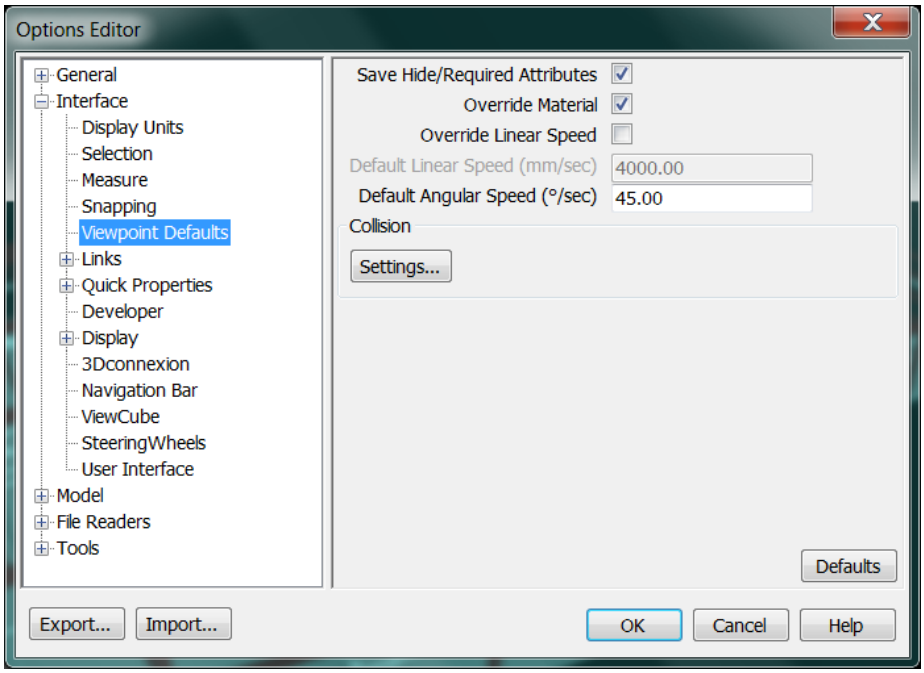
Sample report view – note the locator circle

11.1 Navisworks Saved Viewpoint & Folder structure

It is recommended users are familiar with Autodesk Navisworks viewpoint structure – for further information please consult the help system within Navisworks. It is recommended for best use of iConstruct that 'Save Hide/Required Attributes' and 'Override Material' are both set as default in Tools->Global Options from within Navisworks.

This ensures that new viewpoints created from colour-coded views or displaying a selection subset preserve the view when saved.

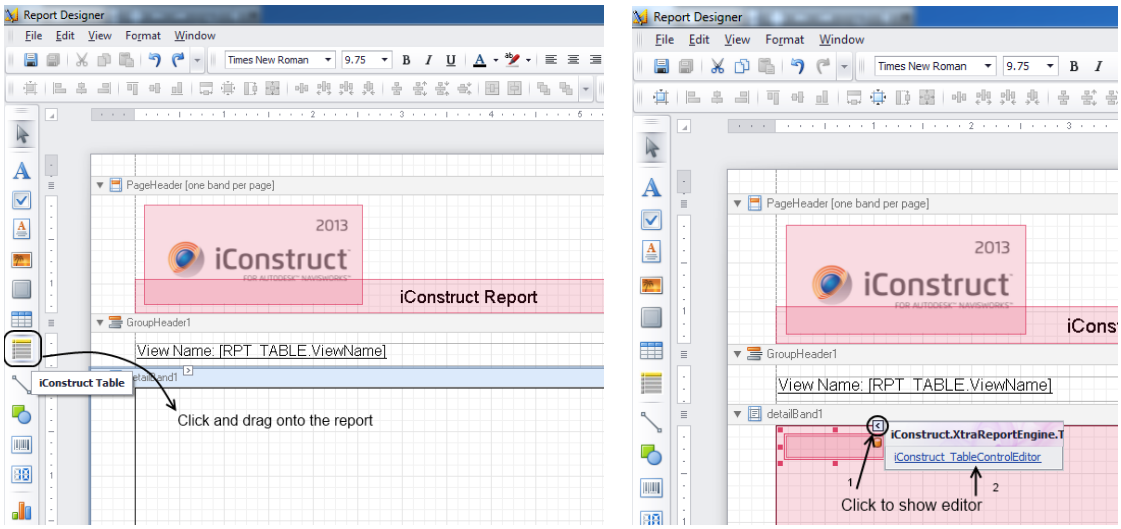
Note, however that when using viewpoints for running a colour code as part of a report, the user will need to untick Override Material for the views/folder to ensure the updated colours are used instead of the saved colours.



11.2 iConstruct Table Control

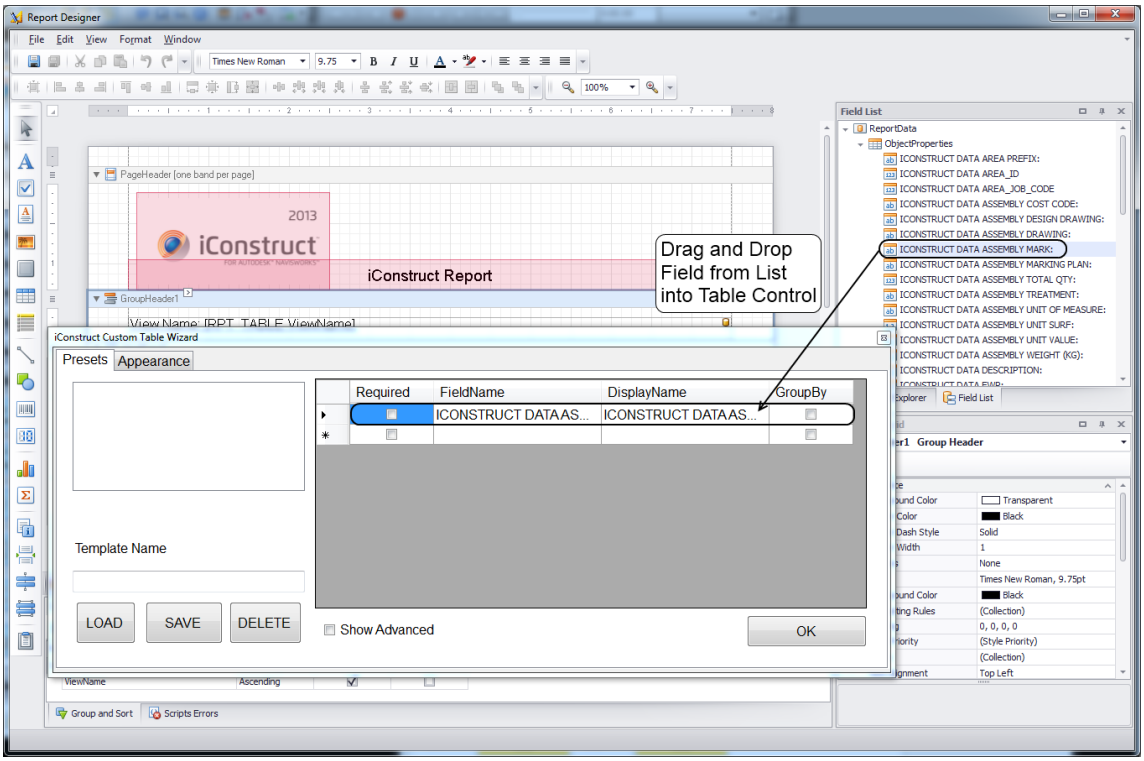
The iConstruct Table control gives the ability to add custom tables based on the visible model data to the view report. The first pre-requisite for this is that 'Import Properties' is enabled.

To create a table definition, first open or create a report in the report designer, then on the toolbar click and drag the 'iConstruct Table' control onto the page.



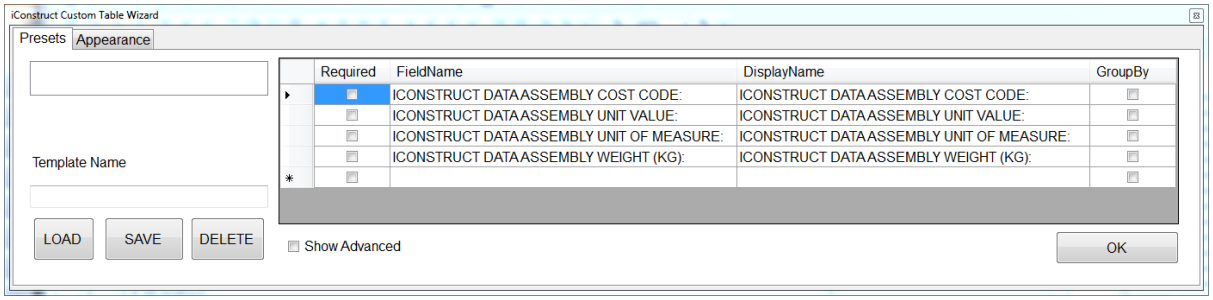
Then to show the table editor, click the **>** symbol on the top right of the control (circled above), followed by clicking on the 'iConstruct TableControlEditor' link. Once the 'Table Wizard' appears, drag and drop fields from the Field List->Report Data->ObjectProperties into the table.

Drag all the required fields into the table before changing other settings (i.e. don't tick 'GroupBy' until all the fields are in place).

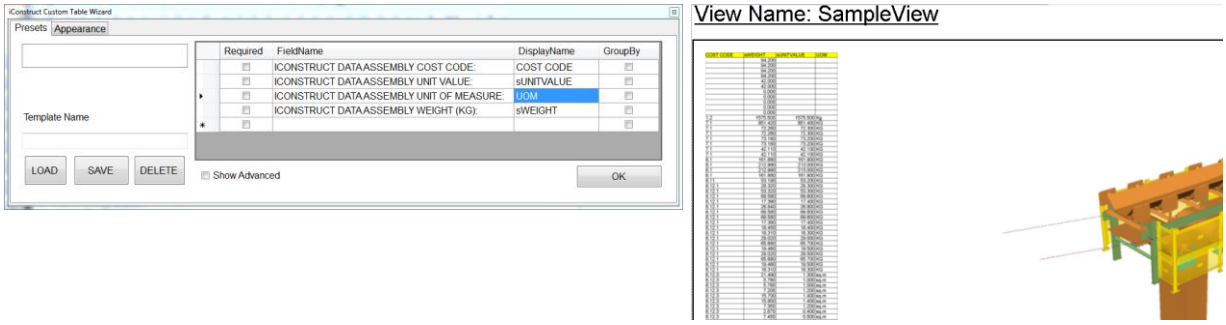


As an example, to illustrate the steps taken to produce a cost code table:

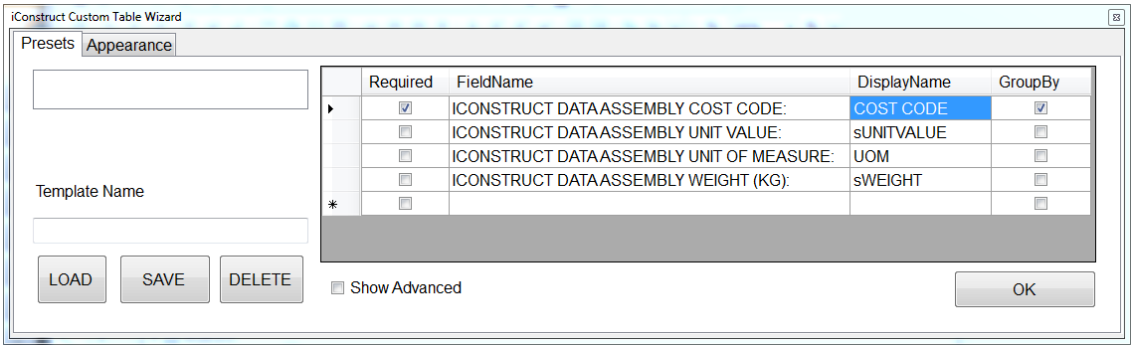
1. Add the relevant fields to the table – since this is a cost code report, the relevant fields are ‘Cost Code’ (to group + summarize by), Unit Value, Unit of Measure and Weight. By default the display name is the same as the fieldname, which is generally too long once the table is created. **Note that Weight is added last as we are going to use that to total the table.**



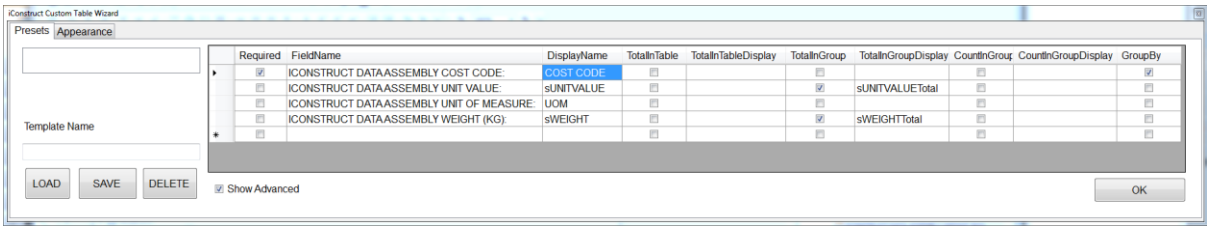
2. The next step is to rename the DisplayName to something more concise, note that the numeric fields are prefixed with an ‘s’ (for single) – this is because we will be using the Group Display name instead, once the field is grouped. To the right is the table as-is. Note that for items without a cost code there are some blank fields, and that the data is not grouped or summed.



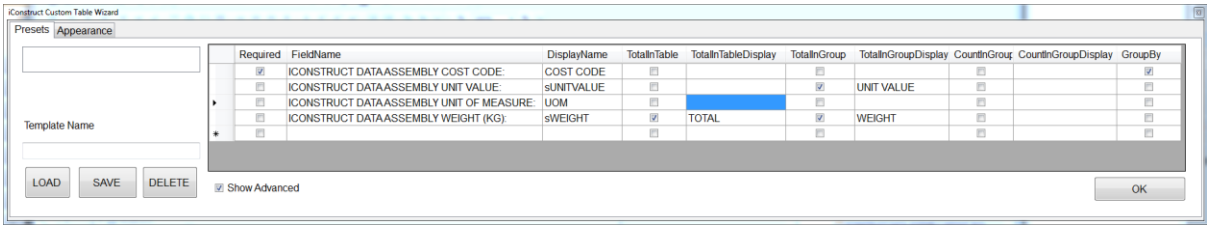
3. For this report only items with a cost code are required (although this is handy to show there are items in the view unassigned, so reports may vary). So ‘Required’ is ticked in the ‘Cost Code’ column, and at this point ‘GroupBy’ can be ticked next to ‘Cost Code’ also.



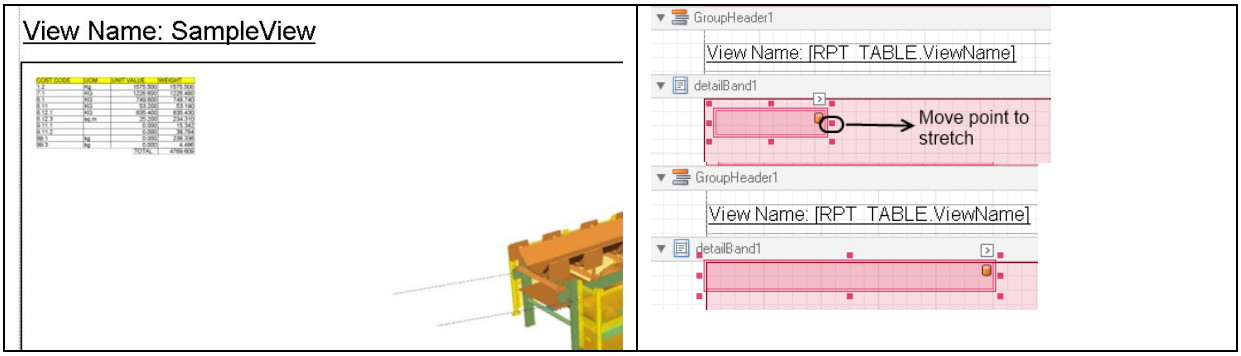
4. The next part is to rename the grouped column names, and to add a total to the table. To do this tick the ‘Show Advanced’ checkbox, and extend the panel to show all the columns.



5. The only changes that need to be made are for the ‘TotalInGroupDisplay’ names to change for the table, and to tick ‘TotalInTable’ on the total field and give it a display name also (in this case Weight is a consistent unit so that will be used for the summary). **Note the Total column must be the last column in the table**.

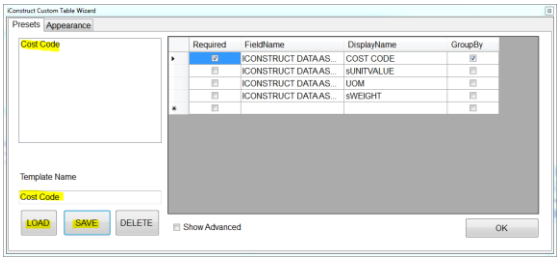


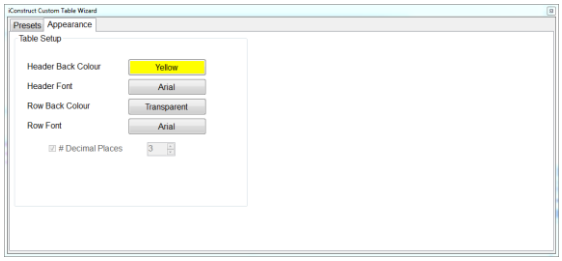
6. Now when the report is previewed, the table has the right data but appears too small to read clearly. To fix this, switch back to ‘Design’ mode in the report editor and stretch the table control across. The table control automatically adjusts the height of the table according to the width set by the report designer.



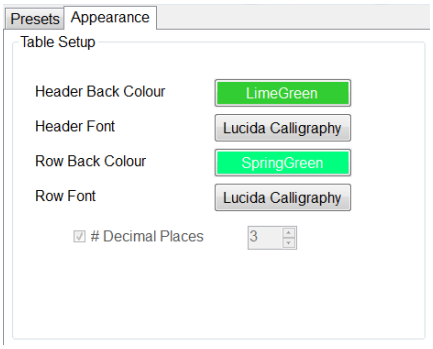
7. Previewing the report for the final time shows the table now has the correct data and is clearly legible.

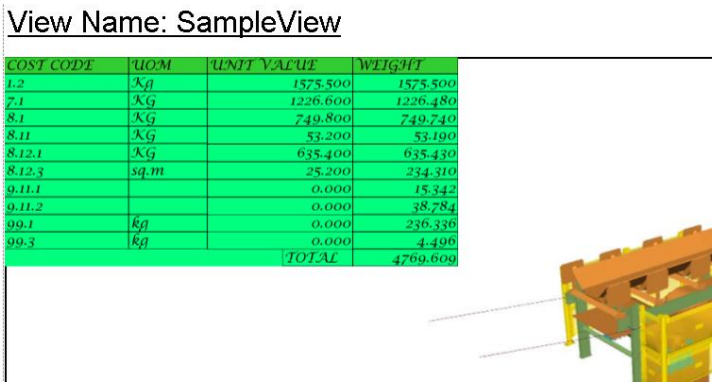
To save a table control template, for use in other reports, type a ‘Template Name’ and click the ‘Save’ button – to use in another report select the template and click ‘Load’. The appearance of the table can also be changed by switching to the ‘Appearance’ tab.





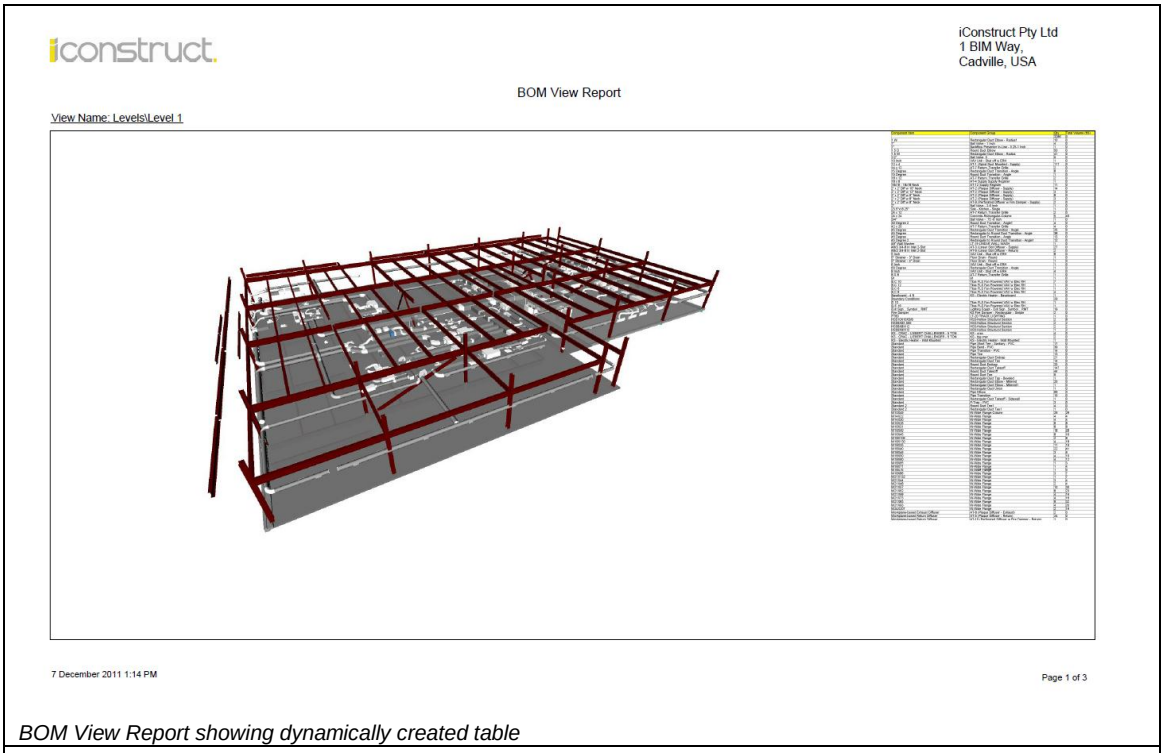
From the appearance tab, the colour of the background can be altered, as well as the font style used (see example below).



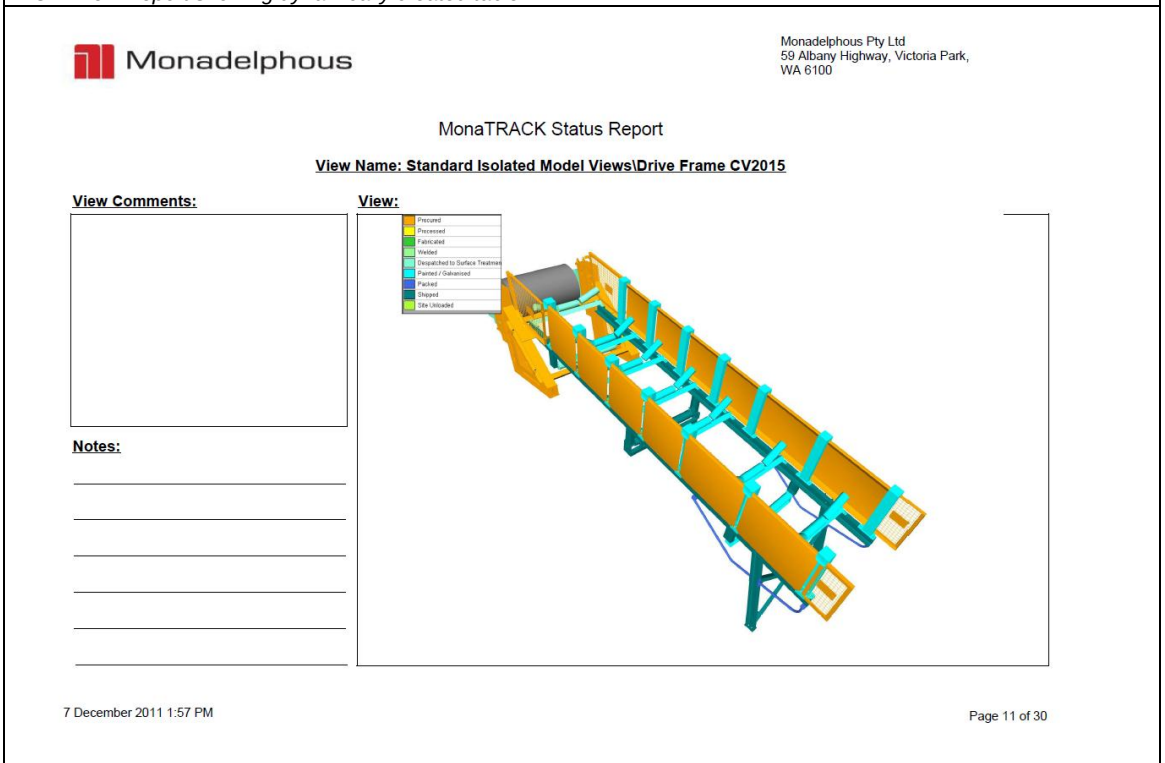


11.3 Examples

Below are a couple of examples of what is possible with the export view report.



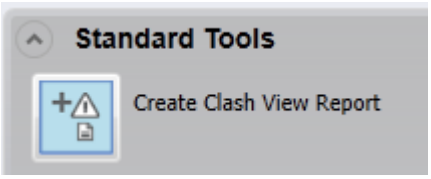
BOM View Report showing dynamically created table



Colour Coded Status Report

12 Clash View Report *Available in Navisworks Manage Only

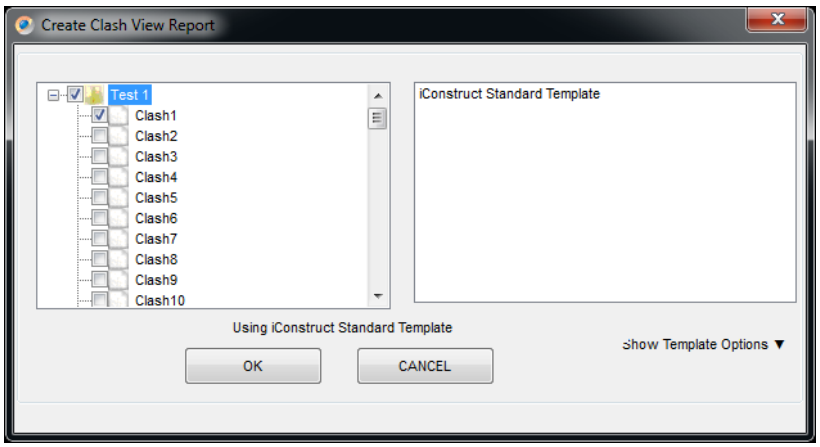
The **'Create Clash View Report'** command allows a report of selected clash views to be created, along with a nominated property (see **'General Configuration'** section) for both the clashing items.



The Clashes will also be grouped under their associated batch. The report can be run on a model that has had clash tests run.

12.1 Overview

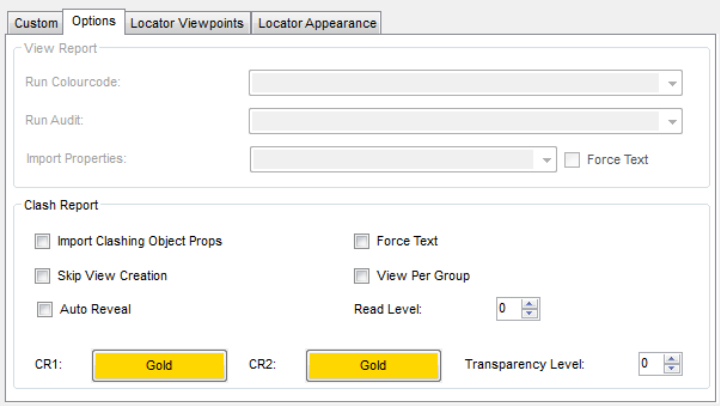
'**Create Clash View**' command will use the clash saved in clash detective, so it is advisable to go through the clashes first to get the viewpoints looking correctly. The command will also grey out all the items except for the 2 clashing items which will be highlighted in yellow. This does not work if the model has had presenter materials applied to it though, as these cannot be overridden.



To produce a report, select the **'Create Clash View Report'** icon and select the Clash Views that are to be included and select ok. The report will then be displayed in the sample viewer, where it can be saved out as a PDF or Excel file. The Clash Report will also use the default logo and address (see **'General Configuration'** section).

12.2 Create Clash Report

'Create Clash View Report' templates can also be used to modify how reports are displayed by clicking **'Show Template Options'**.



For information on 'Custom' and 'Locator Viewpoints'/'Locator Appearance' tabs, see the chapter on the standard view report.

'Import Clashing Object Props' can be checked to read all the properties from all tabs of the two clashing items, to present more information to the end user relating to the clash.

'Skip View Creation' is used when the clashing properties are required but not the viewpoints (i.e. for a clash status summary graph). This significantly improves the time to generate the report.

'View Per Group' instead of each clash being reported on a single view, a group is treated as one clash. The individual clash data for the group can be reported on in the report by using a 'DetailReport'

'Transparency Level' can be checked to make all non-clashing objects semi-transparent, useful for identifying clashes in hard to see areas.

The **Read Level** can be adjusted from 0-9 – this is useful as Clash Detective will return the two objects' geometry – if the objects are part of a group or block and the group information is needed this can be adjusted to read from a higher level up.

The colour of the clashing object can be selected by changing the colour of the **CR1** and/or **CR2** buttons. This is useful for singling out each object in a clash.

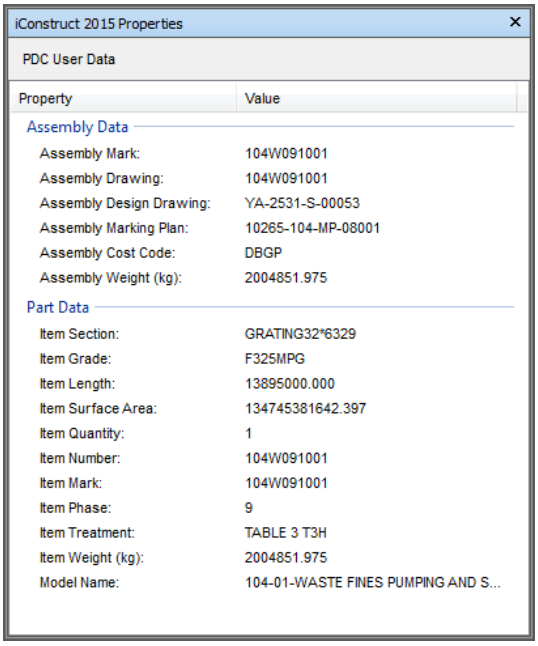
'Auto-Reveal' is used to ensure the clash point is not obscured by other geometry.

'Force Text' is used when there are inconsistencies with the model property datatype (i.e. a property value changes from a date property type to a number on certain objects). This option forces all data to be treated as text in the report.

13 Property Panel

The custom iConstruct Property Panel will help reduce confusion whilst supporting project standards as users can use this to create a simplified display of object properties. It also will reduce the amount of navigation required to find project related data**,** and with read-only functionality, will also help protect the integrity of information behind the model from unauthorised editing.

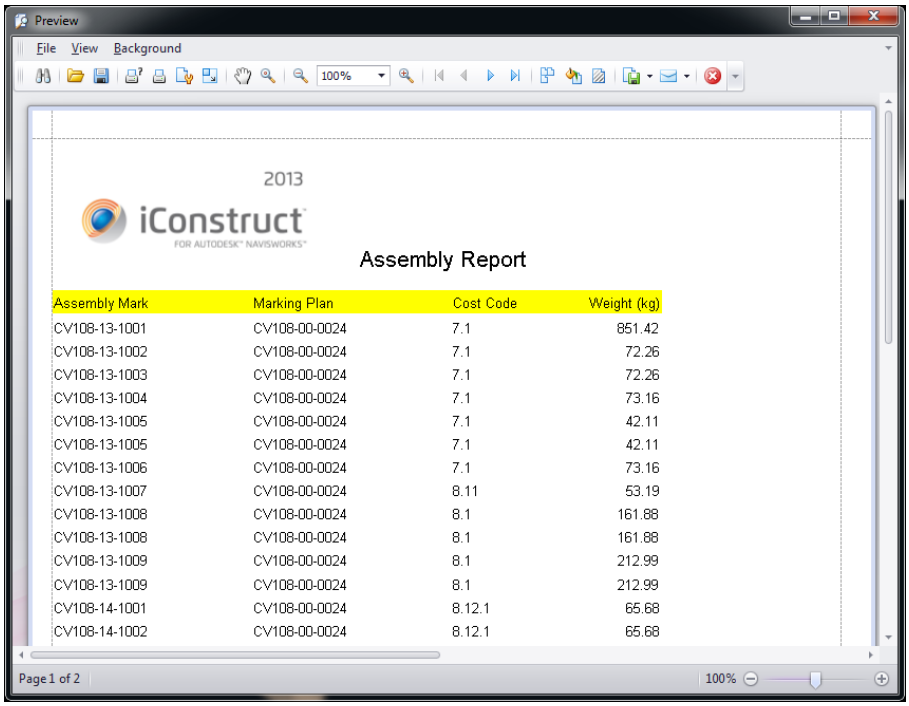
The property panel will display property and value data from an item selected in the drawing as defined by the **'Default Data Tab'** attribute in **'General Configuration'** (see '**General Configuration**' section). The panel can be docked or floated freely.



14 Export Data

The export data feature of iConstruct allows users to produce their own reports from Navisworks data in various formats, from Excel sheets to a well formed report. To get access to the Export Data Command's that have been set up and established using the **'Export Configuration'**, select the **'Export Data'** Menu to expand the menu.

To produce a report, select the items within the model that a report is to be provided on, and select the appropriate command. For Excel, MS Access and Clipboard, it will either write to the file or open in the application. For the report option a preview will be displayed before having the options to save to PDF or Excel.

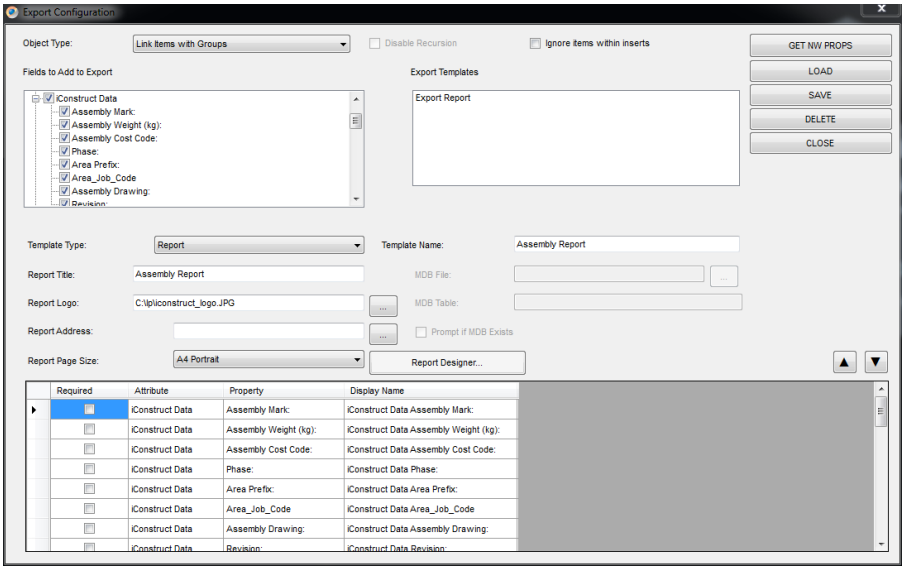


14.1 Export Configuration

The Export Configuration allows for selecting report types to be generated and what content to be included based on selected elements within the Autodesk Navisworks model. Once a template has been saved, an export command will be added to its associated menu. After this has been added to the menu, the user can produce on-the-fly reports from selecting items within the model and running the appropriate export data command.

To begin configuring an export template, the user will need to choose sample data in which to draw the property fields that will be included in the report and select **'Get NW Props'**.

Note: Attention will need to be paid to the selection resolution that is being used, e.g. if the user picks a sample item and it is the sub-part of a group, the group data property names will not appear.



Once the data has been refreshed, the user will need to determine whether Group and/or Item data will need to be included in these reports. Click the drop down menu and select 'Group Data', 'Item' or 'Link Group with Item', depending on if the user wants Group information, Item information or a report showing items that make up a group. Once this has been selected the **'Fields to Add to Export'** will populate. Select the properties to be exported and they will appear in the content grid at the bottom of the dialogue box.

The user will then need to determine which report file type that they wish to use for the export template. iConstruct provides the user with four export options: Report, Microsoft Excel, Microsoft Access, and to the clipboard.

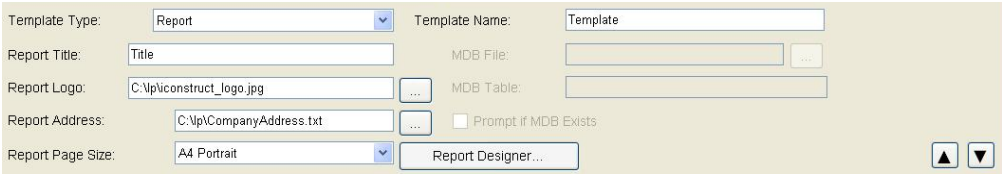
Disable Recursion: When disabled will process selected paths only

Ignore Items within inserts: Disregards matching data if below insert or block level.

Note: The columns within the content grid will adjust depending on the reporting type selected.

14.1.1 Customising the Report Display

After determining the reporting file type the user can begin customising the report and its output. There are a few options that can be edited in this section:



Template Type: The data can be exported to standard reports, Excel spreadsheets, Access databases, or to the clipboard.

Report Title: This will appear on the report output header as the name of the report.

Report Logo: This defines the logo that will be presented on the report output. If a report logo is not defined in this field it will use the default logo assigned within General Configuration. Enter '**%MODEL%\CompanyLogo.jpg**' if the logo is in the '**nwd**' model's folder.

Report Address: This will display a defined address on the header of the report output. The user will need to load in a text file (**.txt**) with the address as a paragraph for this to be displayed. Enter '**%MODEL%\CompanyAddress.txt**' if the address is in the '**nwd**' model's folder.

Note: Report Title, Logo and Address will only be displayed on report and '**.xls**' report types.

Report Page Size: The user can determine the report paper size (**A3** or **A4**) and or orientation (**Portrait** or **Landscape**).

Template Name: Is the name that the template will be saved under, and the title of the command that will appear under its associated menu.

MDB File and Table: The '**.mdb**' file (if '**.mdb**' report type is selected) that the user wishes to write to as a report is specified by either typing directly into the '**MDB File**' / '**MDB Table**' textboxes, or selecting the '**...**' button to the right, which will bring up the '**MDB Access Details**' dialog box.

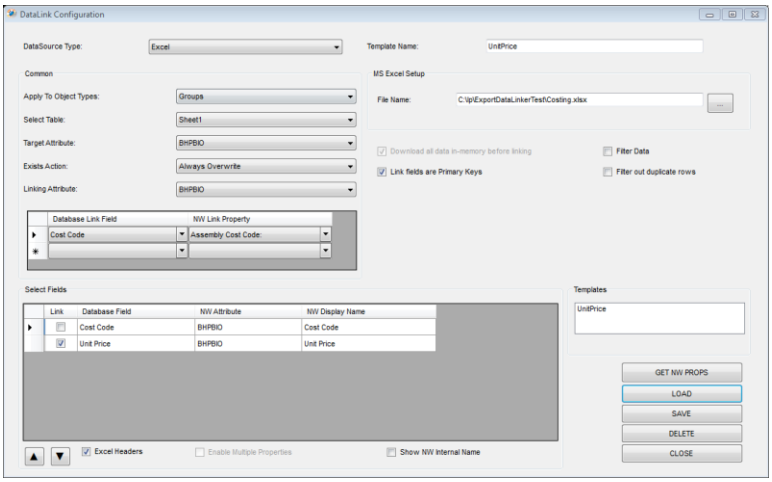
Prompt if MDB Exists: If checked will prompt the user if the Access '**.mdb**' file already exists and should be overwritten.

Note: '**MDB Export**' is presently not capable of appending to an existing database. Selected data should be uploaded from the '**mdb**' to a central database if this is required.

Report Designer: Click this button to modify how the report will be displayed.

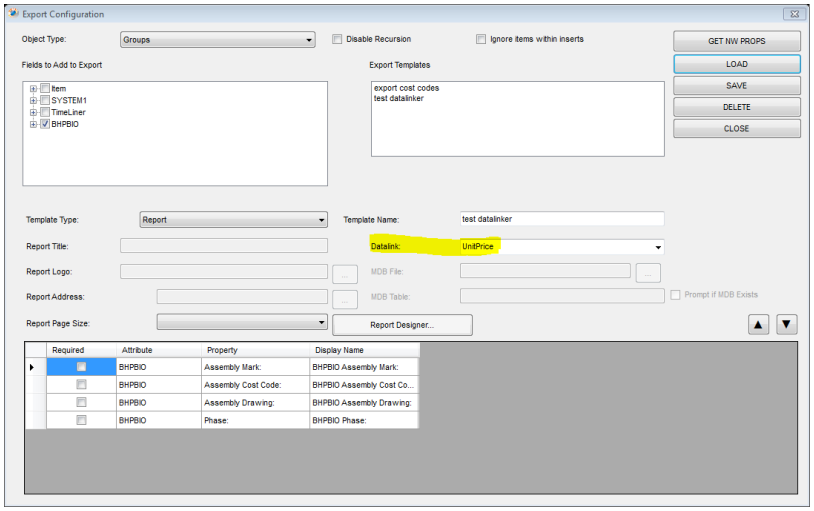
14.1.2 Linking Export Reports to external live data at runtime (Report type only)

1. Create a Datalink template such as the one below

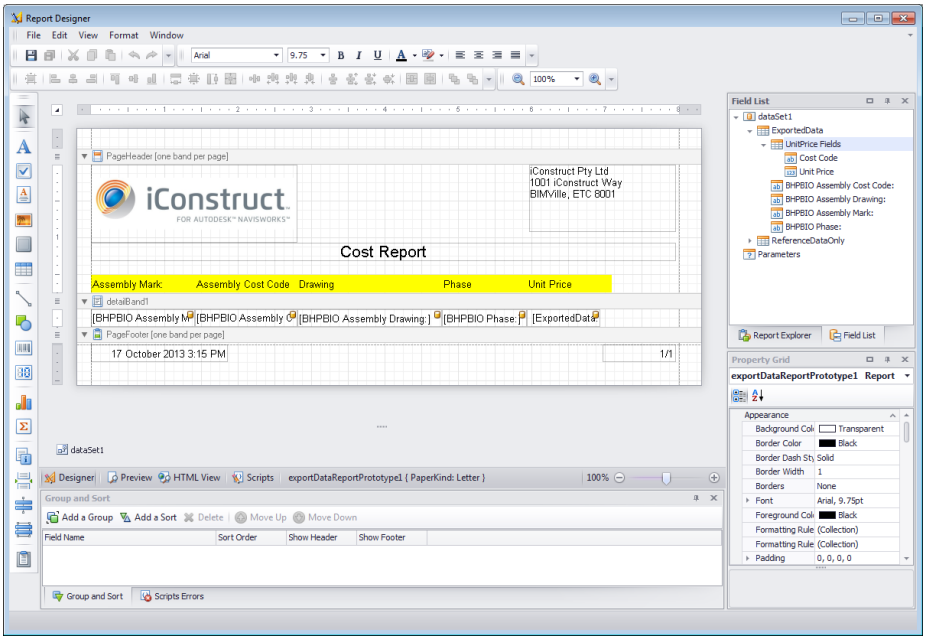


2. When creating the export report, use the new 'Datalink:' drop down to select the datalinker template. The important part to remember is that the user must include the same property or properties that were used in the datalink template to link by. Behind the scenes we are linking the Database Link Field in the datalinker template to the NW Link Property in the exported data table (instead of to the model object).

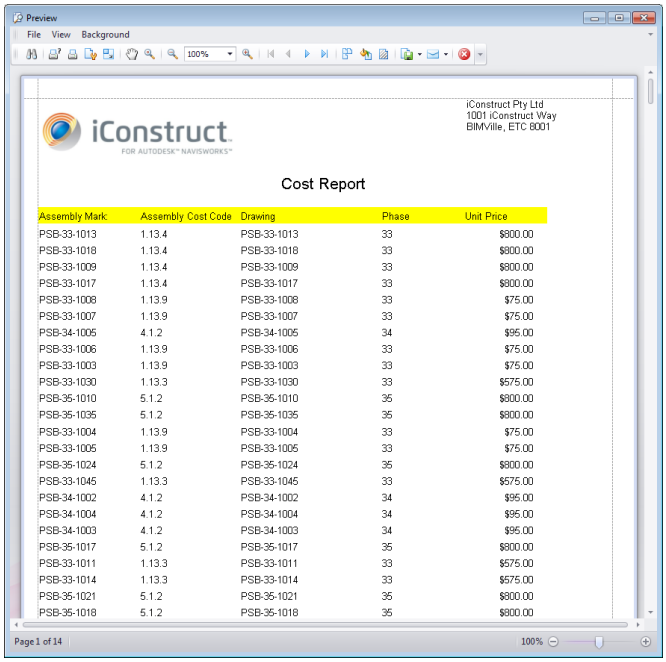
Note that the activation of the datalink template will not add the columns to the export configuration table. All the fields that are ticked in the data table will automatically be populated (as well as the linking fields).



3. In the report designer, there is now an additional sub table nested inside ‘ExportedData’ – this table is named with the Datalinker template name plus “Fields” i.e. our Datalink template name was saved as ‘UnitPrice’ so it appears as ‘UnitPrice Fields’. To use the field we just drag and drop as usual, and where there is a matching link the data will appear. Note the other table ‘ReferenceDataOnly’ is not for use and is just the storage table for the linkage.

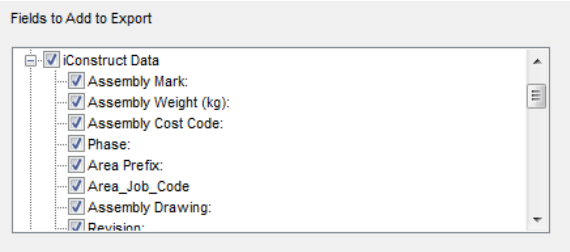


And the final report:



14.1.3 Customising the Report Content

After the samples have been selected and the Group and or Item data has been determined, the **'Fields to Add to Export'** will begin to populate.



From this list the user will see group and/or item categories and properties of the selected sample. If the category is selected (e.g. '**PDC User Data**') it will include all the properties within that category. The user can also expand the category and manually select the properties that they wish to include in the report. As the check box is selected, this item will be included in the content grid.

14.2 Data Types

Export configuration allows users to select various types of data for exporting data from Navisworks. These types include:

14.2.1 Excel

Use this format to export model information from Navisworks to an excel sheet based on configuration being made on export configuration page. Excel gives the opportunity of:

- Graphically displaying equations (analytical models) and real data
- Obtaining numerical solutions to more mathematically complex models
- Graphically comparing results from a model and observations
- Displaying histograms of numerical values
- Displaying numerical values in a formatted more convenient style

Regardless of what version of Excel users may have on their computer, iConstruct exports required data to a new Excel sheet and displays to the user.

14.2.2 Reports

If users are looking at creating a customized report based on data in the model and hand it over, this option would be a good choice. Using iConstruct report designer, users find it very easy to create report templates with headers, company logo and graphical design.

14.2.3 Access (MDB)

Access MDB files provides the opportunity to store data so other applications can access that data using ODBC connections to make queries, run formulas, or update data. It's also possible to create security settings on the stored data, create application forms within Access to display or update data or even connect to external data.

But the user should always consider that although Access is a good choice of storing data, it has some limitations for client-server applications or storing large numbers of data.

14.2.4 Clipboard

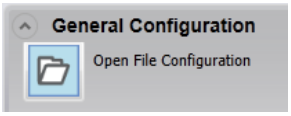
The clipboard is a software facility that can be used for short-term data storage and/or data transfer between documents or applications. Most of the time users only want to copy a specific piece of data to another application such as Microsoft Outlook to simply send it over email, or publishing it within a Word document or a presentation. In such cases, using this feature of iConstruct is recommended. By using clipboard as the template type in export configuration, users can simply run the export template command from the '**Export Data**' menu and '**Paste**' it in every application they desire.

15 Open File

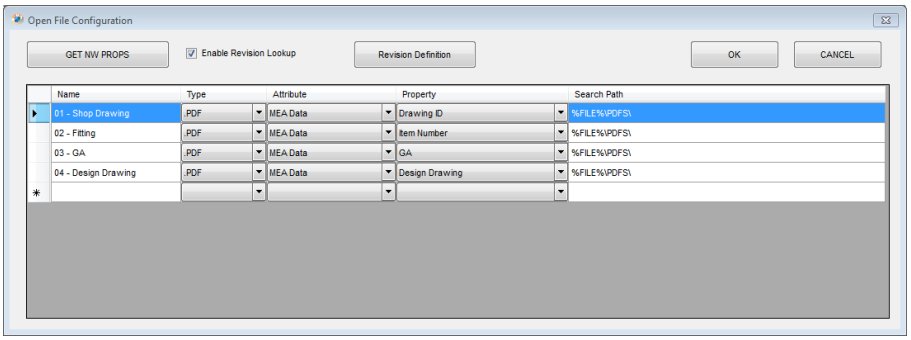
This command allows the user to specify an application to open a file based on the selected model item associated to a file linked to the command.

15.1 Configuration

The **'Open File Configuration'** allows users to identify the properties to be used within the model as a basis for linking files. The aim when using this toolset is to identify a common relationship between the name of an external file and a property within the model, so that these files can be accessed when and where needed without having to find its location. Once a file has been linked the command will appear under the **'Open File'** menu.



To begin the configuration, like other configurations, the user will need to select a sample to get the Attributes (Categories) and Properties that they wish to link the model by. Select **'Get NW Props'** to enable the data grid to begin configuration.



There are a few columns and options in this dialogue box, which assist with linking the file to the model based on a relationship with a defined property:

Name: Allows the user to provide a descriptive name for the linked file so end users can understand what file they are likely to open when selecting an object and running the command.

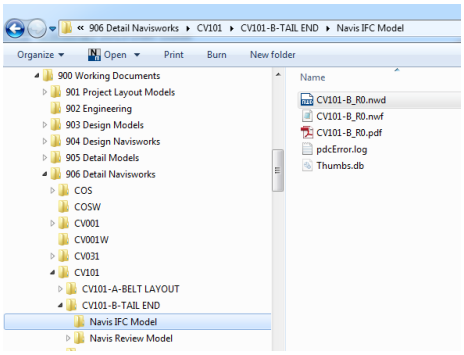
Type: The user will need to determine the extension of the file type that they would like to link back to the model. All registered file types are available so this could be '**.pdf**', '**.doc**' etc.

Attribute and Property: The user will need to determine the attribute and property field to draw the information from to create the unique relationship between the model and the name of the linked file.

Search Path: a search path will need to be determined in order to tell the file definition configuration where to open the associated file from. This search path can be an explicit path (i.e. '**C:\Documents\pdfs**'), or one of two keywords can be used to prompt the search:

'%MODEL%' - finds the '**.nwd**' parent of the object being clicked and searches in that path. For example, if the model was an '**.nwf**' containing several '**.nwd**' files from different locations, the routine will look in those separate locations to link the file. An example of the entry into the search path, '***%MODEL%***' with '**.pdf**' as Type which will pick up and open any '**.pdf**' file with the name matching the name of the attribute of selected item within a model.

'***%FILE%***' - looks in the main file that has been opened and uses the path from this file. In the example above, using this key word it would search in the path that the '**.nwf**' resides in rather than the .nwd file. An example of the entry into the search path may be – '***%FILE%*\PDF\804**' Issued Fittings.



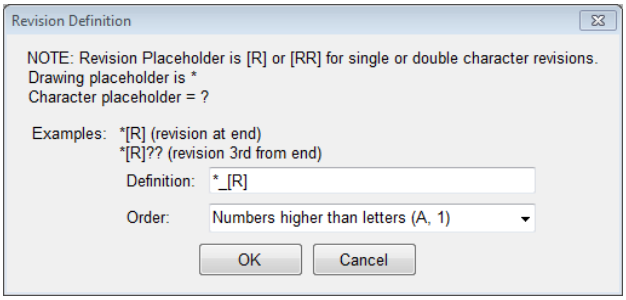
As of the 2013 release is the ability to use relative pathing. For example if the user has a directory structure similar to the one to the left, with many sub folders of areas. If all the pdfs were stored in a central or higher up directory, instead of using %MODEL% to look in the current directory, the following path could be used:

%MODEL%\..\..\pdfs

Which would look 2 directories up, and then in the subfolder **pdfs** from that directory.

Enable Revision Lookup: Ticking the '**Enable Revision Lookup**' box means the routine will automatically find the latest available revision. The default is based on the property name plus underscore plus revision. For example, if there were two '**.pdf**' files '**LFS-04-1002_0.pdf**' and '**LFS-04-1002_1.pdf**' the routine would open the latter.

Revision Definition: For custom revisions, this button brings up a new dialog where the user can define their own revision system. Note that the revision system applies to all open file templates. The drawing place holder is * meaning the property value being read, [R] or [RR] denotes where the revision is to be found and ? is a character placeholder. The default is *_[R] meaning the property value underscore revision i.e. 'LSF-04-1002_0' the file type is then appended to this before searching.


Revision Definition
NOTE: Revision Placeholder is [R] or [RR] for single or double character revisions.
Drawing placeholder is *
Character placeholder = ?
Examples: *[R] (revision at end)
*[R]?? (revision 3rd from end)
Definition: *_[R]
Order: Numbers higher than letters (A, 1)
OK
Cancel

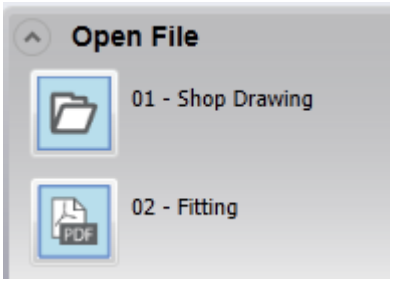
Once the search paths have been set, users can run a selected command from its associated menu **'Open File'**. If the file is found it will open automatically, if the property or the file cannot be found a message will pop up.

Note: If the command that is run is to open multiple '**.pdf**' files, iConstruct will group these '**.pdf**' files in the one viewer. This may assist where instances of batch printing is needed.

As of release 2013 is the file type 'FOLDER' – this assumes the type of files being searched for is a single PDF, but instead of showing the PDF it will open the folder containing the pdf.

15.2 Running the Command

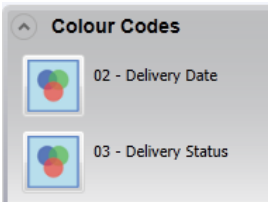
To get access to the Open File Command's that have been set up and established using the '**Open File Configuration**'; select the '**Open File**' Menu to expand the menu. To run the command, select the associated parts of the model that the user wishes to open the associated file linked to the command. When the command is run the associated files will be opened in their default viewer or application or prompt the user to select an appropriate program.



Note: For multiple PDF files, there is an option to combine multiple PDF into one file.

16 Colour Code

Colour Code reporting allows segmentation and grouping of items within a model. The Colour Code tool set links the Navisworks model to an external data source (XLS, MDB and ODBC Data Source), and determine the variables that are to be used for the colour coding based on feedback required from external parties (e.g. Construction Progress, Material delivery status, etc.). Once this feedback is received and run against the model, these variables are grouped and displayed on a predefined legend.

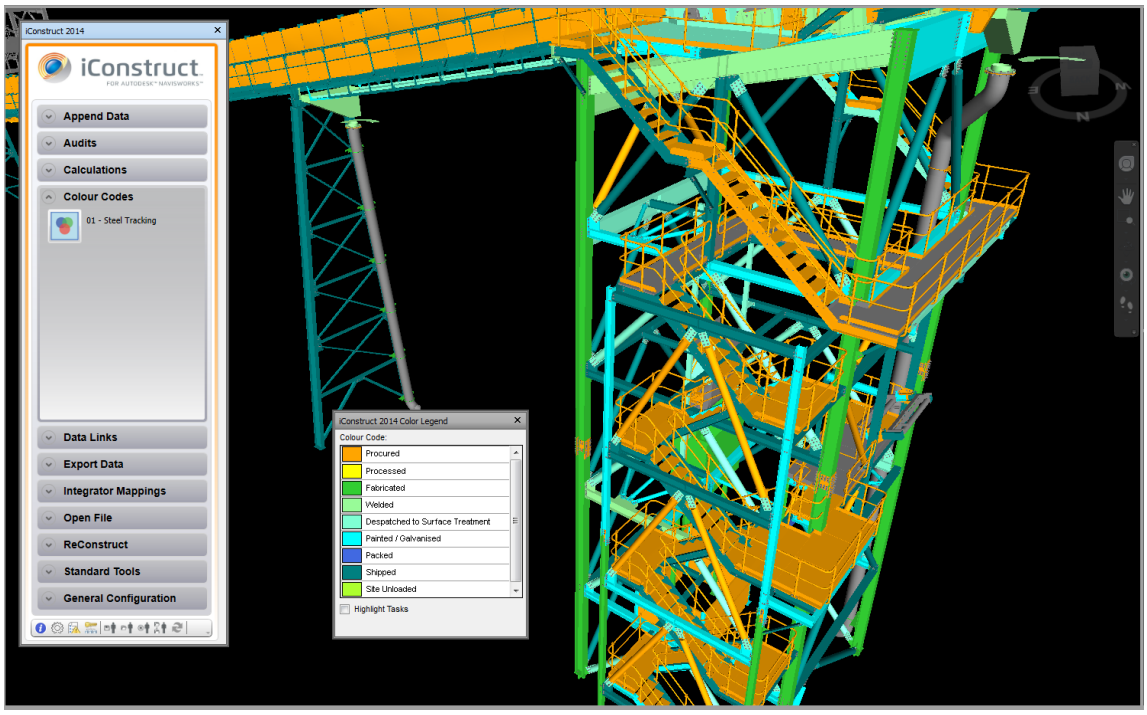


To get access to the Colour Code Commands that have been set up and established using the Colour Code Configuration, select the **'Colour Code'** Menu to expand the menu.

16.1 Basic concepts

The Colour Code tool works based on using a unique matching attribute that is present in the model and external form, to set up a link between the two. After the settings have been configured and the template has been saved the command will appear under the Colour Code menu.

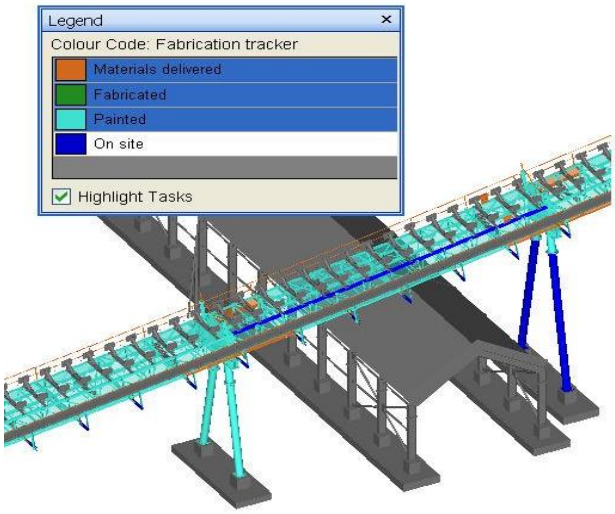
To perform a Colour Code routine from the latest data of the selected Data Source, make sure the source is closed, and then select the relevant Colour Code Command. iConstruct will then check the data source and co-ordinate the model by the predetermined colours for the variables and group into '**Selection Sets**'.



The results from the Colour Code command can be removed by closing the legend, deleting the selection sets and resetting colours and transparencies.

Note: The Colour Code Command will not attach colours to models that have presenter materials applied to it.

A Legend window will automatically appear and can be repositioned on the screen. By ticking the '**Highlight Tasks**' checkbox, when an item in the model is selected, the relevant tasks are highlighted in the Legend window. To view this legend panel without running the full colour code, hold down the left shift key and click on the template. Doing this will disable the ability to highlight tasks, however.



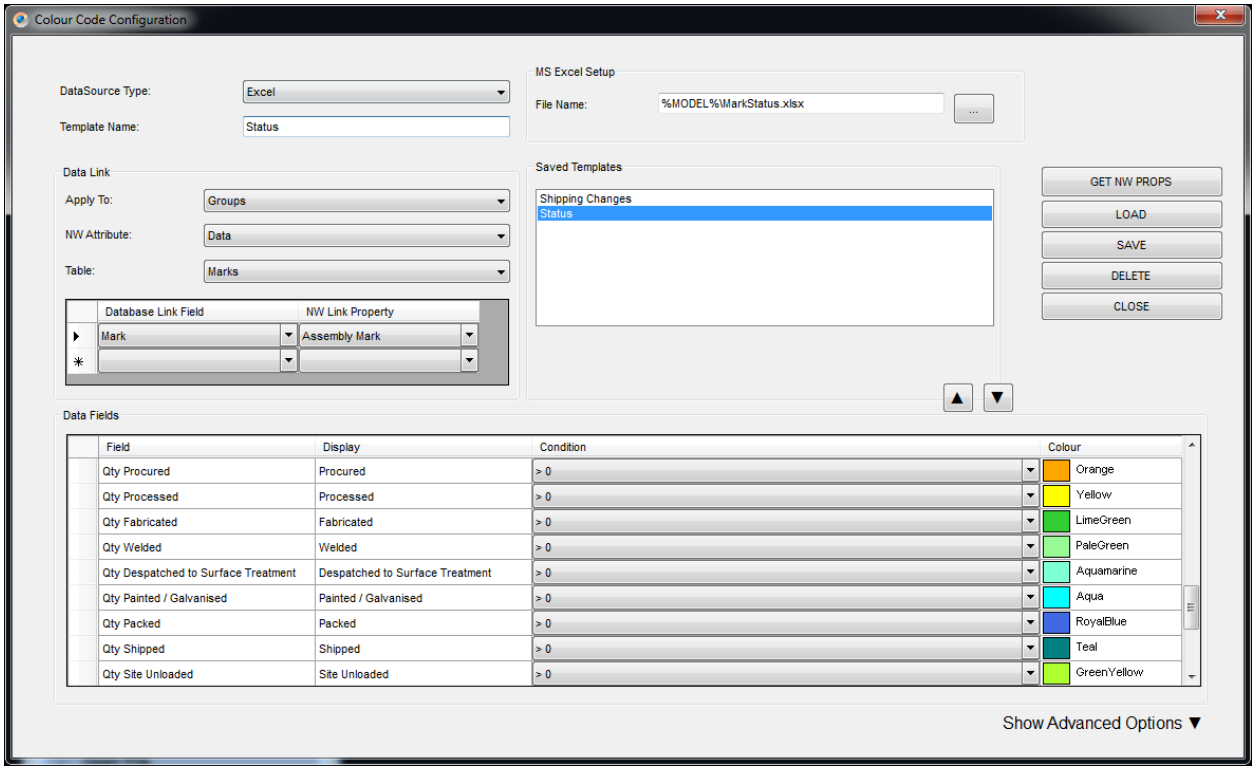
16.2 Configuration

The **'Colour Code Configuration'** allows the user to set up links to external forms where other users can provide feedback on the model and its elements and have this brought back in to the Navisworks model and groups the designated variables under an assigned colour scheme. This additional data can also be stamped into an assigned re-writable data tab.

The export data command compliments this command in that the internal properties of objects can be exported, some additional fields can be inserted for users to fill out, and then read back into the colour code command to create groups for viewing. The Colour Code configuration supports linking to Excel, MS Access and ODBC.

At the beginning of the colour configuration, the user will need to select a sample of the data to give them a range of the properties that can be used to set up a link between the model and external form.

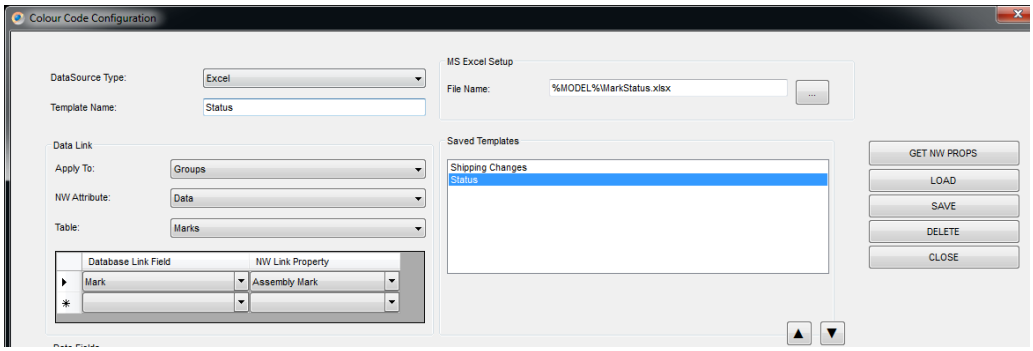
After selecting items from the sample select **'Get NW Props'**. The user will also need to choose the external data source that they wish to link to be able to configure the link and data fields.



Note: The time taken for the Colour Code command to operate relies on the number of Navisworks objects to colour, the number of excel fields to colour by, the number of fields to search in the external file and whether data is going to be appended. Breaking the model up into smaller groups and areas may help speed up this process if performance issues are noticed.

16.2.1 The Colour Code Link

There are a number of fields and options on the Colour Code Configuration that will help with setting up a colour code command:



Data Source Type: This will determine the type of external data source that the user wishes to connect the Colour Code Command too.

Template Name: the name to be assigned to the template and its associated colour code command name.

File/DSN Name: the name of the external file/database that the Colour Code command will connect to gather user data/feedback to group the model based on pre-determined variables.

Data Link – used to determine the model's attributes in Navisworks and that will be linked to a field from an external data source. Here the user will need to indicate the Navisworks models;

- NW Attribute

- NW Link Property

And the external data sources;

- Table
- Link Field

Get NW Props: Get the fields from the sample data to be used when configuring the colour code command.

Load: Load a saved colour code configuration template.

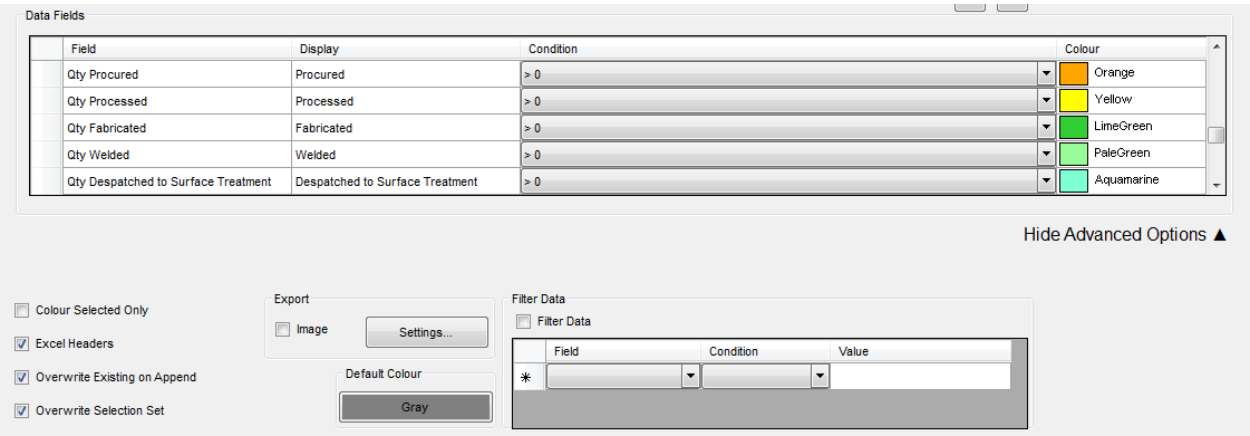
Save: Save the current configuration to a new template or update existing.

Delete: Delete a saved colour code configuration template.

Close: Closes the Colour Code configuration menu.

16.2.2 The Colour Code Presentation Options

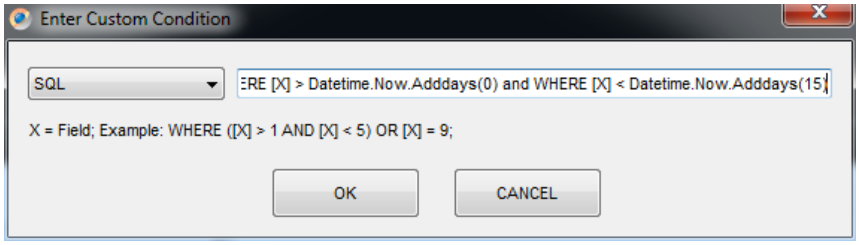
After the link is established, the data field's grid is used to configure the grouping and presentation after running the colour code command. The different columns and options in this grid will assist with this part of the configuration:



Field: The fields from the external data source.

Display: is a re-writable field where the user can customise the display names of the attributes and variables that will be displayed on the Colour Legend and names of selection set results.

Condition: these conditions are used when users want to establish a field as a variable in which a colour is to be assigned to. These conditions can be selected; Not Null, > 0, True, False, Empty, and Custom which includes limited SQL conditions. The colour code command will use this when reading the external data source to see if the attribute is true for that condition.



Condition to colour items occurring within the next 15 days

Colour: Assign a colour that it is to be applied to the relevant object that meets the condition of the variable field.

Append: The user data attribute is appended with a data field property of '**True**' if found in the data source, '**False**' if not, set the data source cell value if set to '**Cell Value**', or not appended if set to '**No**'.

Duplicate Row: Right click on left grey column if the user would like to create a duplicate row.

Colour By Group Only: Searches for the attributes of Navisworks groups while excluding all items. This can increase the performance significantly. If the model only contains items, make sure that this is not checked.

Colour Selected Only: Allows a selection set to be colour-coded and not the entire drawing.

Excel Headers: When selected will expect a header when reading the Excel file.

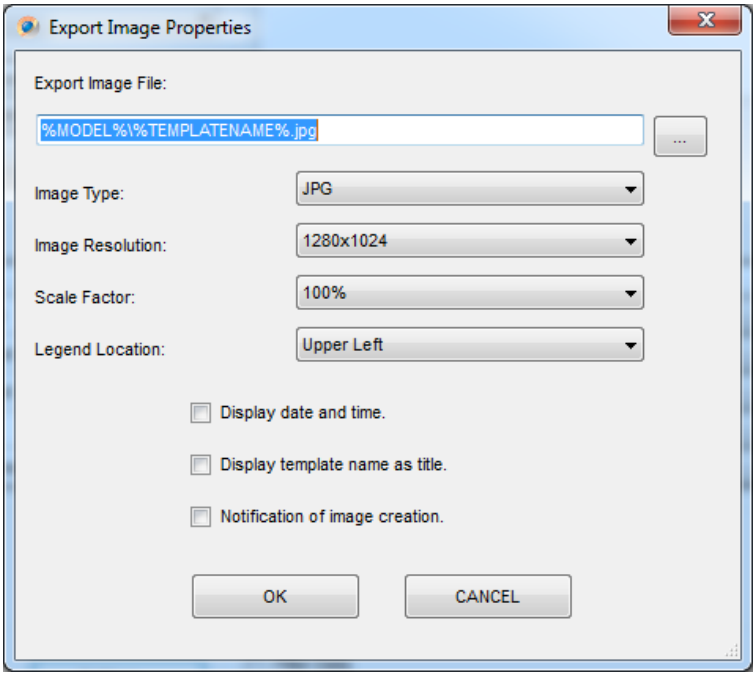
Overwrite Existing on Append: If selected it will overwrite an existing value that may be applied to an object with the latest value.

Overwrite Selection Set: If there is an existing selection set with the same name it is overwritten. If not set, it will not overwrite the selection set but will create new folders with the relevant suffix 2, 3, 4, etc.

Notes: when working with external data sources:

Excel: - the Excel reader scans the first several rows of a spreadsheet to determine the '**Data Type**' be it a number, text, date or Boolean (true/false) value. It may be advisable to have a calibrate row under the header of the spreadsheet with a sample of the data that will be listed below. The sample data should not match the data below, as if it matches a value in the linked column it will perform the Colour Code on the item with the dummy field data appended.

Export Image: Allows exporting a colour-coded screen image with legend to be exported to JPG or BMP formats. Date and time as well as title can be added to the image.



Default Colour: Sets the background colour for all items not coloured through specified conditions in the data fields.

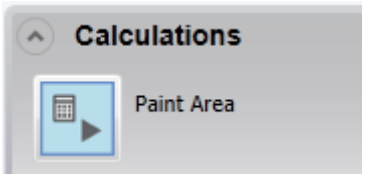
Filter Data: can be used to extract only certain information from the external data source to be used for the colour code command, e.g. values greater or equal to 100.

17 Calculations

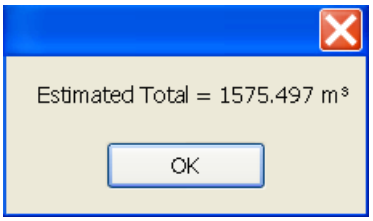
By creating custom calculation templates, users can get accurate totals on the fly from selected items within a Navisworks models. Calculation templates will read the relevant data that has been embedded into the properties of selected items and apply a predefined formula to give accurate and relevant totals. These totals can then be copied and inserted into relevant documentation, emails etc.

17.1 Concept

To run a calculation on properties of items or groups based on formulas created in the '**Calculation Configuration**', select '**Calculations**' to expand the menu.

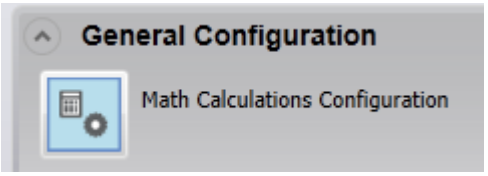


To get a calculated total, select the items or groups within the model that a total is to be collected on, and then select the relevant **'Calculation'** Command. If the calculation has performed successfully an estimated total will appear as follows;



17.2 Configuration

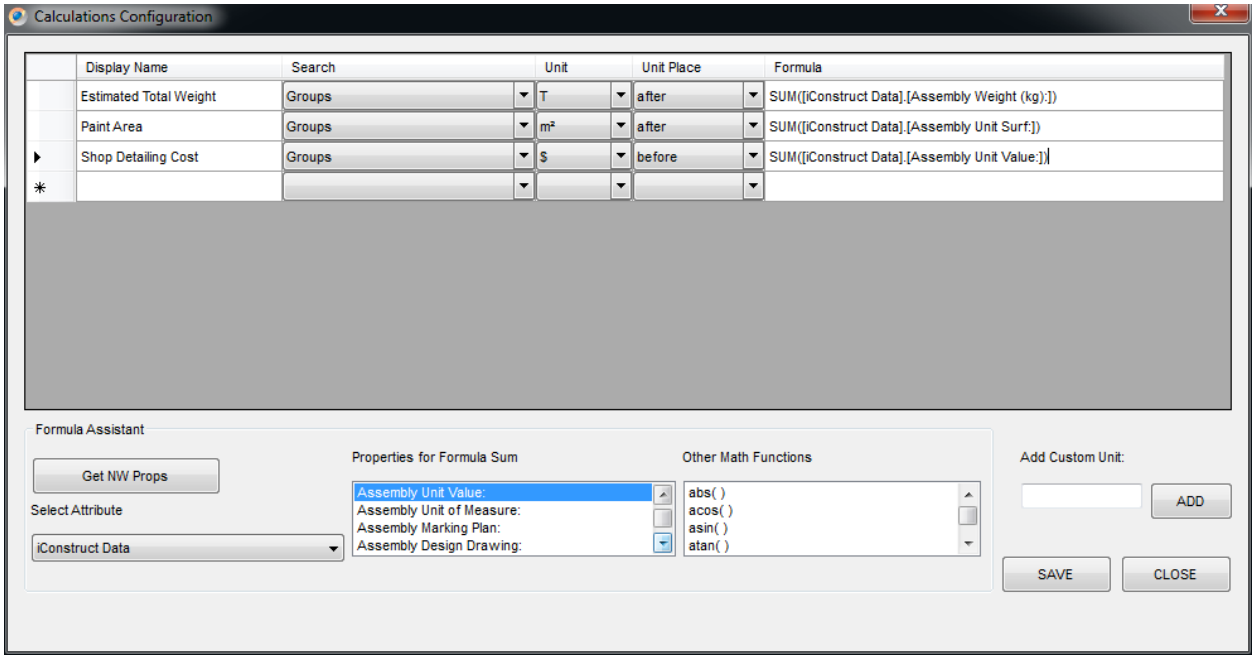
The **'Calculations Configuration'** allows users to create calculation commands that can be used where needed to give totals on selected items based on predefined calculations (e.g. weight load). The **'Calculations Configuration'** allows the use of the JavaScript maths library to perform calculations on the sum of properties. Once a Calculation Configuration template is save, it will be added as a command to the **'Calculations'** menu.



As the Calculation tool provides totals from the internal properties of the Navisworks model, at the beginning of configuration the user will need to select a sample from the model where they are going to get the attributes and properties from to calculate.

17.2.1 Calculation Settings

There are a number of fields on the configuration window that are used to set up a **'Calculation'** command:



Display Name: The name that will be given to the command in the **'Calculations'** menu.

Search: Where the calculation command will search to gather the values to conduct the pre-set calculation. This can be by **Groups**, **Items** or **both**, but remember that using the **Group** option has more performance as it only uses the calculation formula over a group of objects in Navisworks.

Unit: The display unit that will appear next to the value when the calculation is performed.

Unit Place: Whether the unit will appear before or after the formula value. By default it will appear right after the value.

Formula: Where the user can determine the formula that will be used and where to get the values from the Navisworks properties in the model to perform the calculation. The user can use the JavaScript maths family to create a formula in this box manually or use the assistant (see formula assistant).

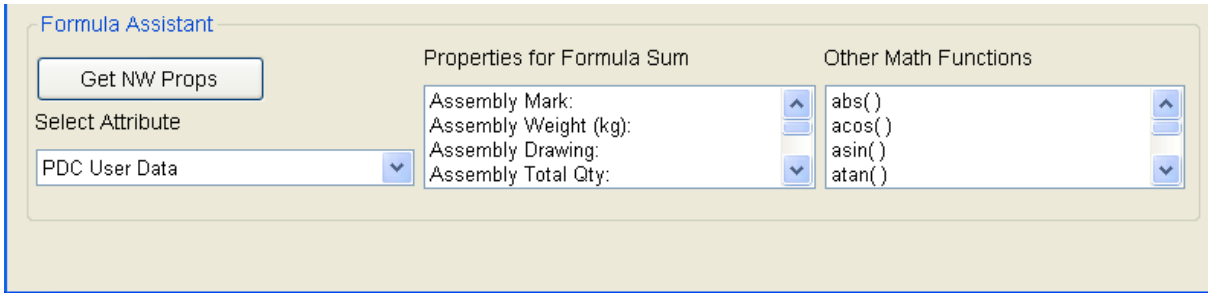
Add Custom Unit: If a display unit is not available in the default unit menu, one can be created here which will add it to the menu for future use.

Save: Saves the current formulas and updates the Calculation commands in the tool menu.

Close: Closes the **'Calculations Configuration'** without saving the current settings, unless '**Save**' has already been selected.

17.2.2 Formula Assistant

If users have not had experience using JavaScript calculations, they can use the Formula Assistant to reach a desired result.



Formula Assistant: Below is a guide on how to use the formula assistant.

1) To add a new calculation command, type the name in the '**Display Name**', e.g '**Estimated Mass**', then the objects to search on (Items, Groups, or both), and the unit to display.

2) Then to build the formula, click **'Get NW Props'** (make sure a correct sample is highlighted in Navisworks) in the '**Formula Helper**' box and then select an attribute. The properties box will then populate.

3) Then highlight the property that is to be added to the formula, and drag it to the formula box (hold down the left mouse button on the property, move to the formula box and then release the left mouse button).

4) The formula will automatically add the Attribute name and the '**SUM()**' keyword. Parts of the formula inside the parenthesis will be evaluated for each object and added together. Outside of the '**SUM()**' statement other calculations can be placed to make use of the total result, but no properties should be outside of the '**SUM()**' statement.

If the calculation needs to be more complex than a total sum of the values from selected items, the **'Other Math Functions'** box can be used to assist or as a guide. Simply drag the required calculation from the **'Other Math Functions'** Menu into the **'Formula'** section.

Note: The '**SUM()**' still needs to be present to give a calculated figure based on a determined formula and properties.

When using the Math Functions box, some understanding of the JavaScript maths family will be required to complete the formula, a guide can easily be found on the internet. Properties can still be dragged from the Properties list, and as the mouse hovers over the formula the caret will appear, showing where the property will be inserted.

After each formula is saved, it will become available as a command under the **'Calculations'** menu.

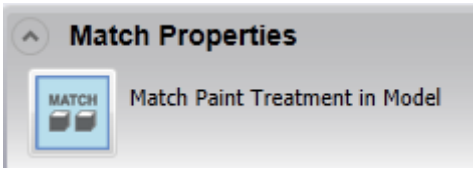
18 Select Similar

The Select Similar productivity tool will improve the end user experience and efficiency with the ability to create customised Match Property shortcuts to find all '**like items**' within a model with the click of a button. This tool can be used quickly to find like items within the model to be used in conjunction with other iConstruct tools. As of the 2014 release is the ability to save the result as a search set.

18.1 Concept

Select Similar is a useful tool that can be used to find like items within the model, of a certain property, to that of the one selected. This can help speed up the process for consultants and construction professionals to be able to quickly find all similar items instantly without having to set up filters or using Navisworks' Find Items.

To use the '**Select Similar**' command on a model based on templates created in the '**Select Similar Configuration**', select the '**Select Similar**' tab to expand the menu.

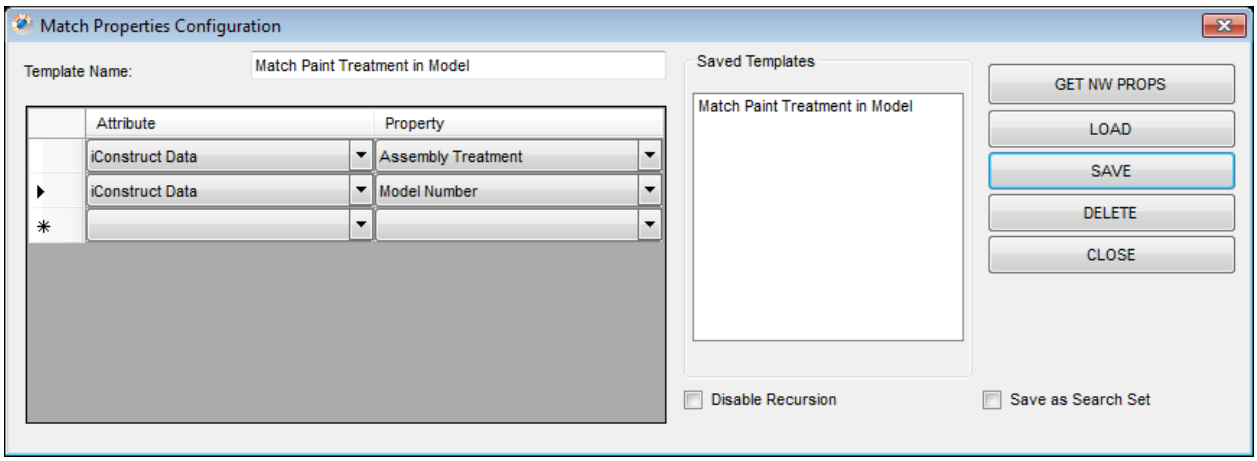


To find similar items using the '**Select Similar**' command, select the item(s) within the model that the user wants to match and then select the relevant command to find others in the group. Once the command is run, the other like items will highlight so they can be grouped into selection sets in Navisworks.

18.2 Configuration

The **'Select Similar Configuration'** will allow the user to set up a number of templates to be used as commands in the **'Select Similar'** Menu. To begin the configuration highlight a sample and then select **'Get NW Props'.**

There are a few selections within the **'Select Similar Configuration'** which will assist with setting up the templates and commands;



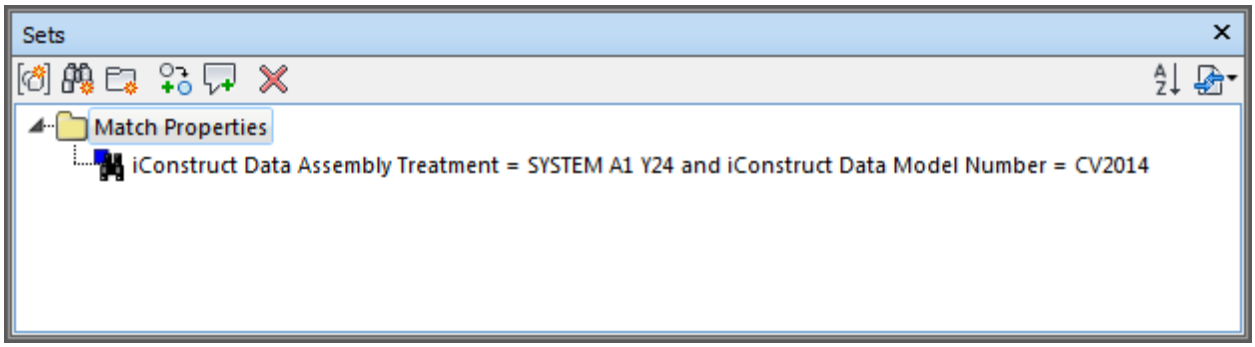
Template Name: The name that will be assigned to the template and also the name given to the command in the **'Select Similar'** menu once saved or updated.

Attribute: The attribute (or properties data tab) from the Navisworks sample that is to be used to find like items with.

Property: The property (within the attribute or data tab) from the Navisworks sample that is to be used to find like items with.

Disable Recursion: Select if matching only block level and not matching any further, like at the item level.

Save as Search Set: Check this box if a search set is to be created when running the command. The search set will be placed in the folder 'Select Similar' in the sets panel.



Load: to load a selected saved template for editing or viewing.

Save: to save a new template or changes made to an opened template.

Delete: to delete a selected template from the list.

Close: to close the configuration window.

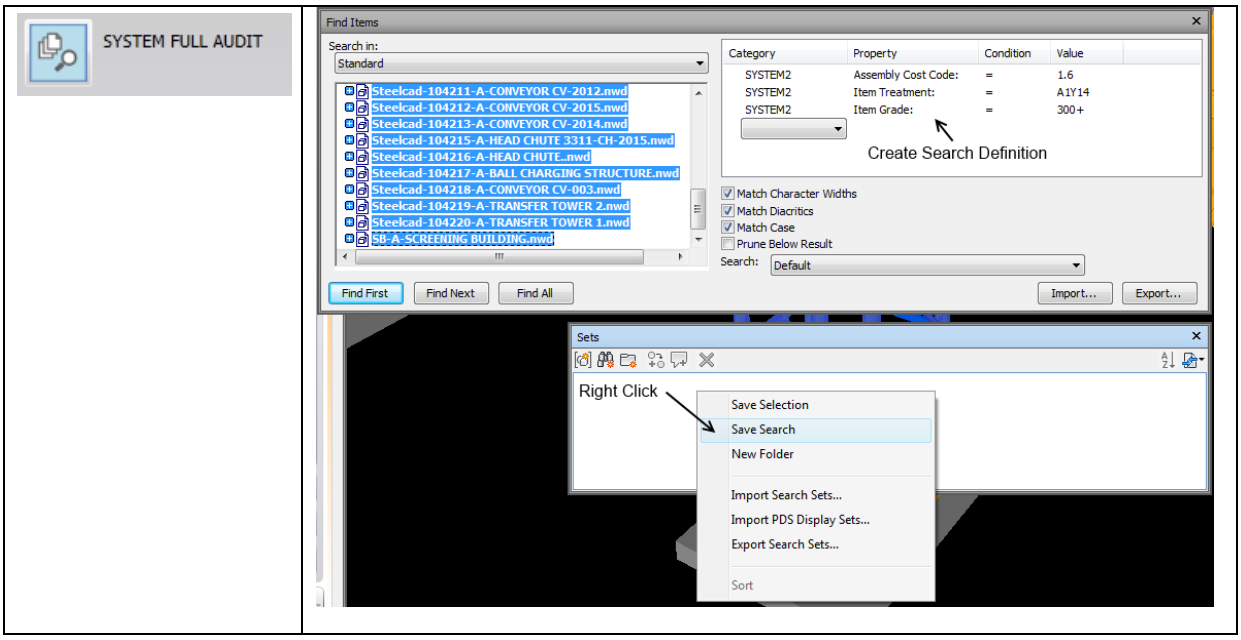
19 Audit

Provides a valuable tool to audit the model data within Navisworks to ensure it meets required project and quality assurance requirements. Various visual displays and outputs can be established to present Audit model findings to meet model manager and project team preferences.

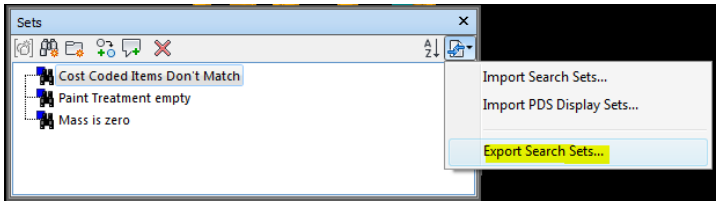
19.1 Concept

Audit Model allows for loading an XML file containing search sets to be used when running an audit. To run an audit based on '**Search Set**' rules created in the **'Audit Model Configuration'**, select **'Audits'** to expand the menu. Search Sets (Find Items) built in Navisworks can be exported to xml.

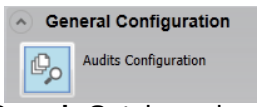
Use the 'Find Items' panel to define a search, then right-click in the 'Sets' panel to save the search (or use 'Select Similar').



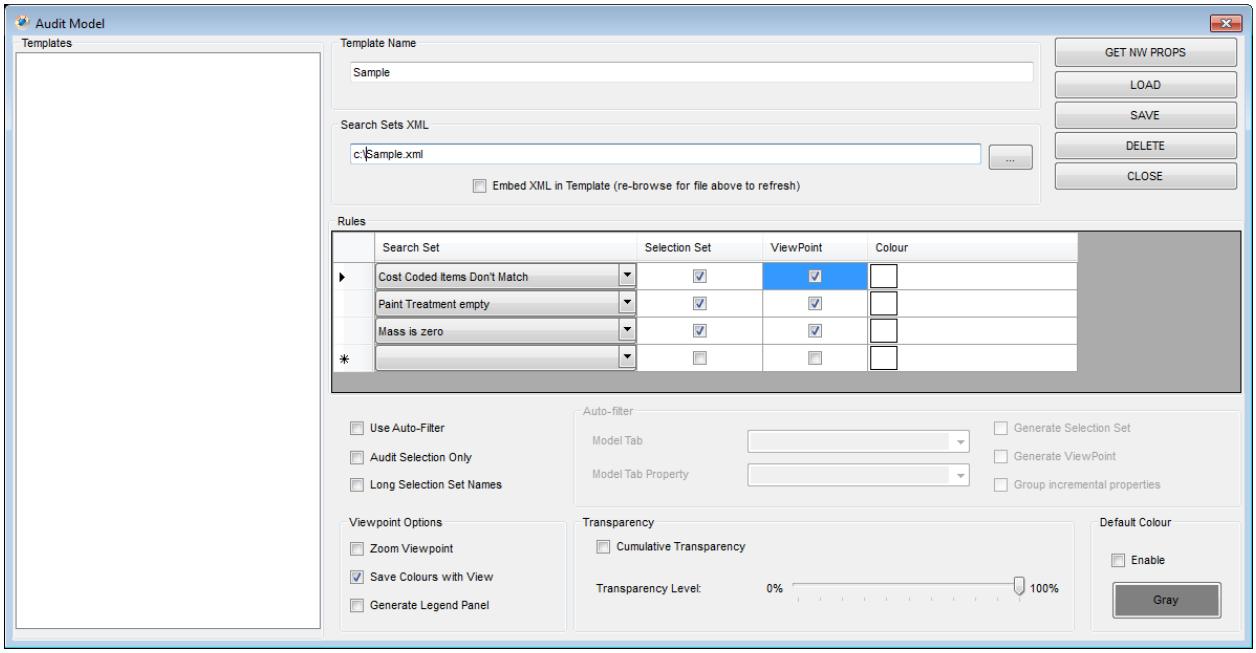
Once the search sets have been created, export the sets as an xml file:



19.2 Configuration



'**Search Sets**' can be selected in the '**Rules**' section where Selection Sets and Viewpoints can be checked so that they are generated.



Also a Colour including transparency can be applied to that Search Set.

The **Transparency Level** can be adjusted from 0% opaque to 100% transparent.

Cumulative Transparency can be selected so that transparency is not reset after each rule is applied.

Default Colour is the base colour to set all items at the start before anything is coloured against the rules

Use Auto-Filter is used primarily for creating viewpoints (see below)

Audit Selection Only indicates that the audit only applies to the currently selected items, otherwise it applies to the entire model

Long Selection Set Names is used when creating selection sets, the set name will contain a description of the search sets used, similar to the way search sets are named in 'Select Similar'

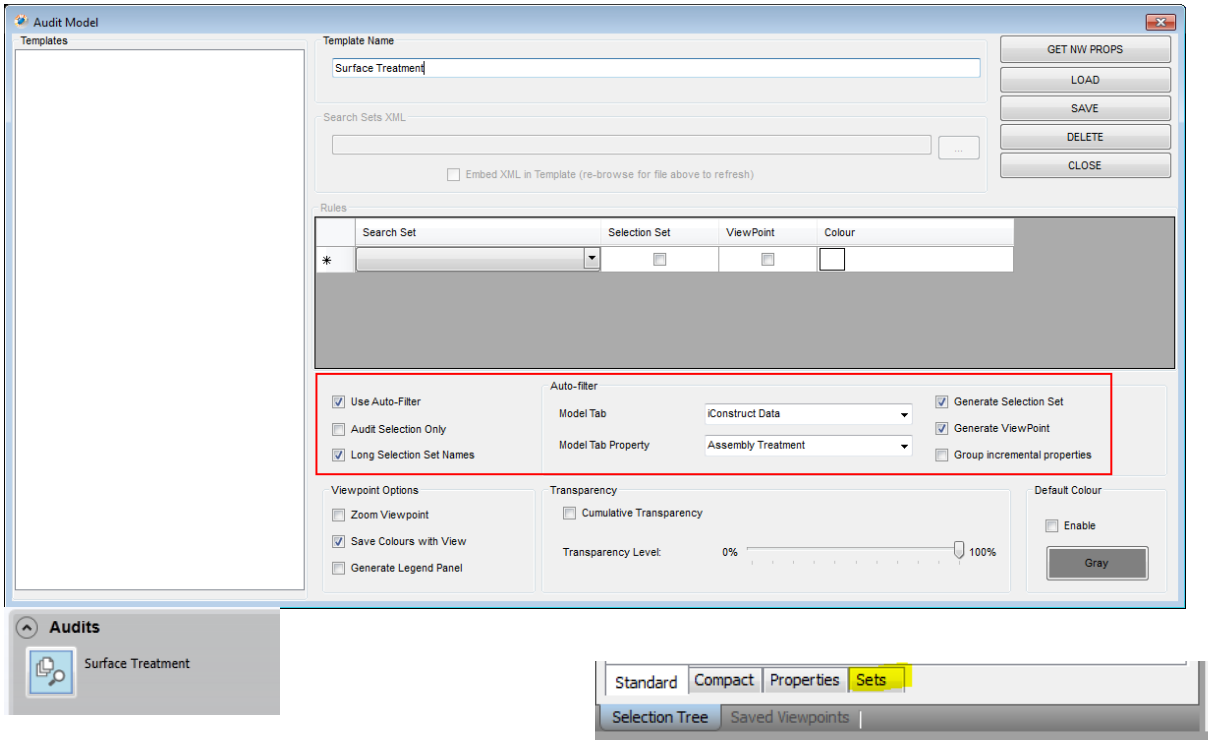
Zoom Viewpoint ensures that for each generated viewpoint, the view is zoomed to fit. This is recommended.

Save Colours with View ensures that the 'Material Override' is set when a viewpoint has been created.

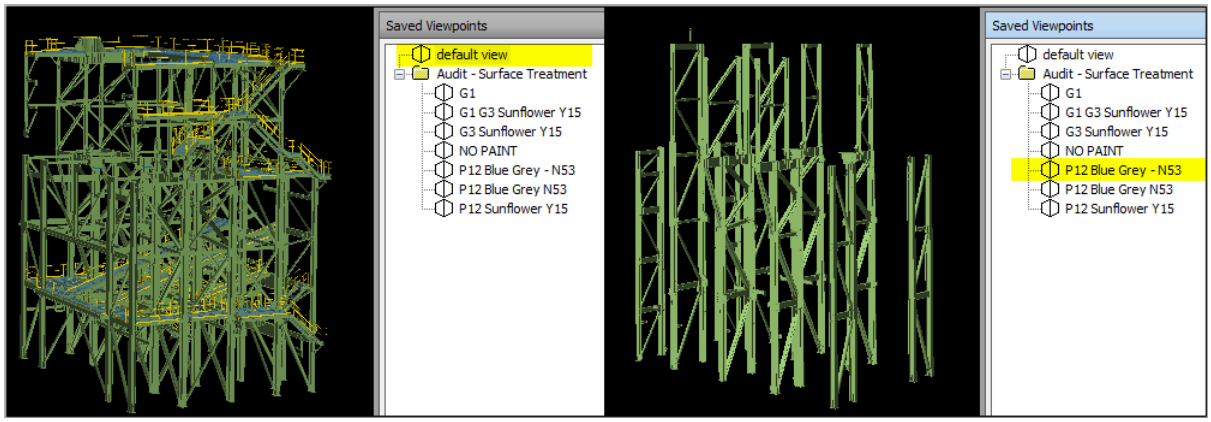
Generate Legend Panel enables the display of a colour coded legend panel when the colour has been set in the audit.

Auto Filter – Simplifying the Audits.

Another way to use Audit Model is to select the '**Use Auto-Filter**' checkbox and then filter by a specific '**Model Tab**' Property. If Generate Viewpoint is checked as shown below, viewpoints will be generated with all objects for each value of that property. 'Zoom to viewpoint' is useful where small isolated items may be difficult to see, if this is not ticked, the viewpoint will remain as is.



Viewpoints and Selection Sets are generated for each audit property.

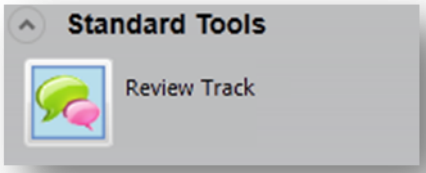


Selection Sets are also generated when auditing and they can be used when exporting reports or running calculations on the audit filter results. A common work flow would be to run several different audits on the model based on data required by each discipline further down the line. The user may wish to run a colourcode before the audit if this helps identify potential issues in the model.

Note: Do not use Audit Model when searching for dates. There is a Navisworks issue relating to the conversion of dates to the local time. Please use Colour Code Configuration instead.

20 ReviewTrack™

As projects increase in size, the need for collaborative design reviews from multiple users increase. iConstruct offers a new feature that responds to this need.



ReviewTrack™ utilizes the internal Navisworks' comment system along with Saved Viewpoints in association with a centralized Microsoft SQL Server database to offer a review tracking system complete with in-built redundancy.

20.1 Concept

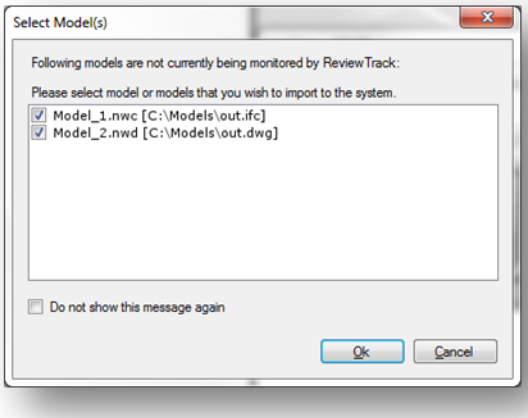
ReviewTrack™ installs as an iConstruct 2015 standard tool. It uses iConstruct's API to generate user interfaces and database access. ReviewTrack stores ViewPoints and Comments in SQL Server instead of the model itself. This feature offers a powerful data availability feature even from outside Navisworks. Furthermore it offers a new hierarchical messaging system (Conversations) with unlimited fields from different types.

ReviewTrack identifies each model using a customizable unique ID generator formula. In the new design each model has its own identity. This is a very useful feature when users want to have Viewpoints and Conversations of a particular model after appending in other models. In other words when a ViewPoint is created and assigned to different models, that ViewPoint is still accessible even if each of the models gets opened separately. We will discuss this feature in the next few pages.

Running the module for the first time will display a window asking whether to import the model into the managed system or not. This window has a list of all opened models in the current work space. These models are either appended or merged in one file.

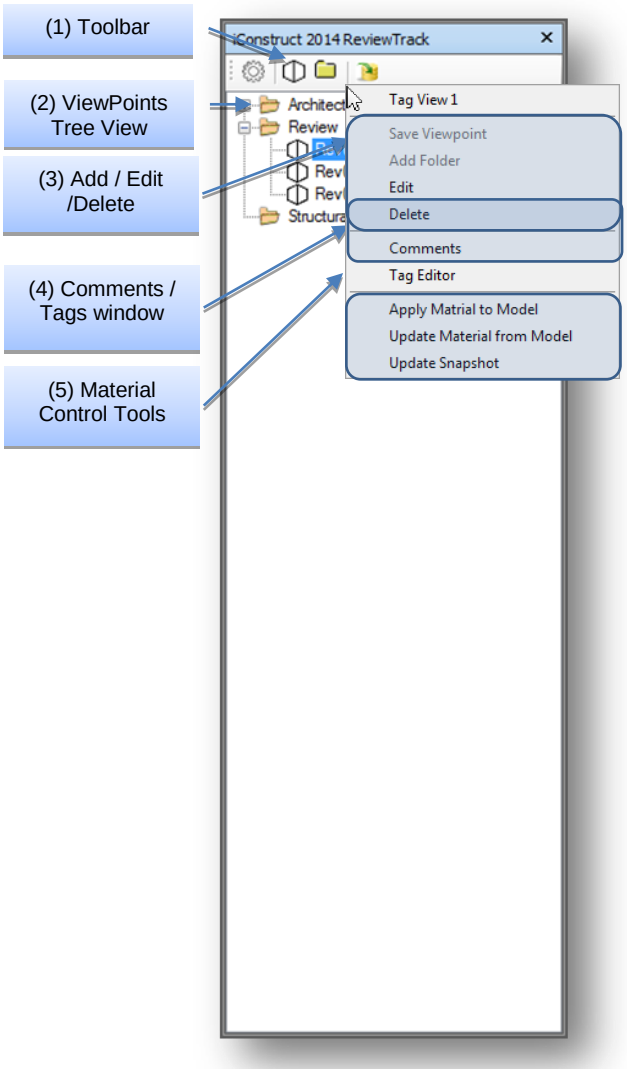
Each model is displayed in the list by its model name and source file name with a check box. By pressing 'Ok' the system generates unique identifiers for each of the selected models in the database to store model information including ViewPoints, Redlines, images, and Conversations.

This module consists of three main panels: "iConstruct Saved ViewPoints", "ReviewTrack Comments" and "ReviewTrack Tag Editor".

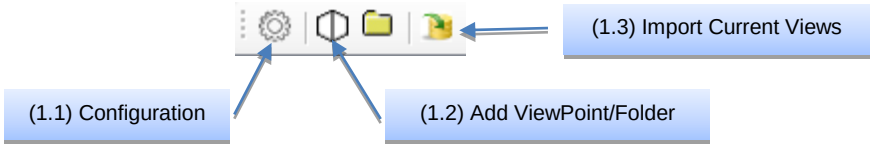

Select Model(s)
Following models are not currently being monitored by ReviewTrack:
Please select model or models that you wish to import to the system.
Model_1.nwc [C:\Models\out.ifc]
Model_2.nwd [C:\Models\out.dwg]
Do not show this message again
Ok
Cancel

The ReviewTrack ViewPoints panel lists all Viewpoints with similar functionalities as Navisworks' Saved ViewPoints window, except that the new panel works with the ReviewTrack database.

The user can add new “Viewpoints”, edit names, create “Folders”, and drag-drop viewpoints into the folders. It is important to note that changes in this window do not have any effect on the model itself. This means if the user creates a ViewPoint, this ViewPoint will be saved into the database only and not the model.



At the top of the window there is a tool bar of available commands. There are other features and commands available by right-clicking on the tree view.



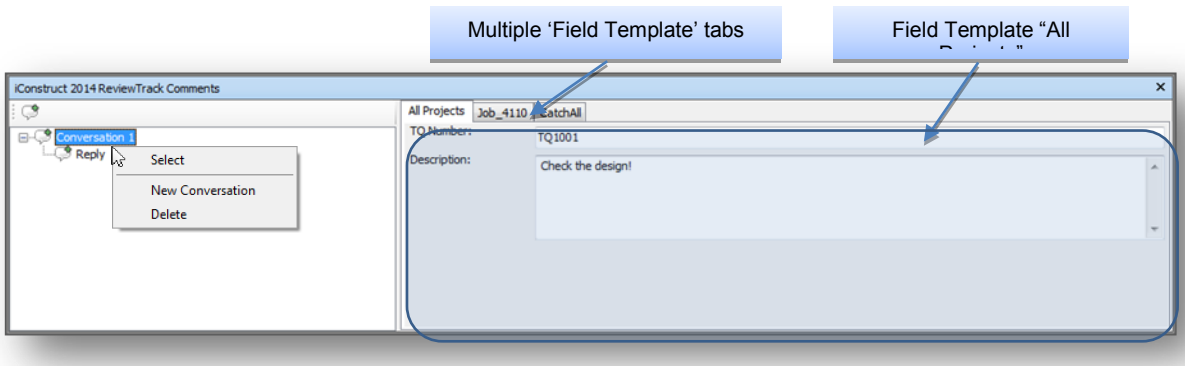
1) Toolbar
   - 1.1) ReviewTrack Configuration
   - 1.2) Add Folder and ViewPoint
   - 1.3) Import current ViewPoints and Comments
2) Tree view representing hierarchical structure of Folders and ViewPoints
3) Add, Edit, and Delete ViewPoint and Folder Views
4) Opens Comments and Tag Editor panels
5) Apply material from a ViewPoint to/from the model, update ViewPoint snapshot

The second panel, “ReviewTrack comments”, shows a list of comments of the selected ViewPoint. This panel has two sections: Comments, and Fields Values.

In the Comments section all of the user comments are displayed in a new tree view format. By selecting each comment, values of fields for the selected comment will be displayed in the “Fields” section.

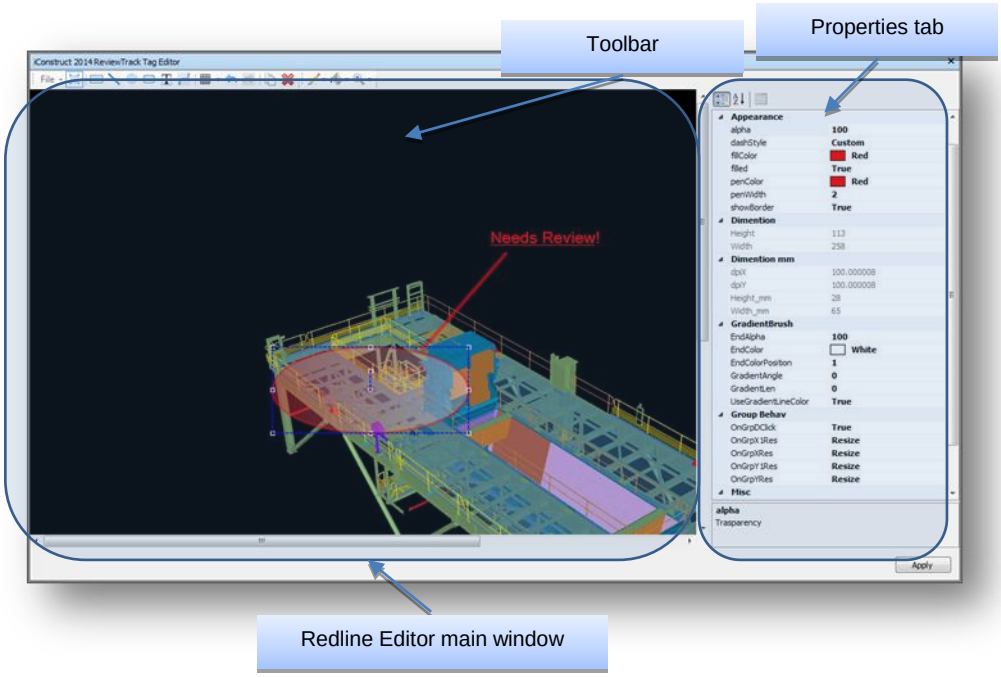
Second section (Fields), is a customizable section to use for storing different parameters for each comment based on the project needs.

Each ‘Tab’ in this section represents a ‘Field Template’. A ‘Field Template’ is a set of Fields with customizable type and order. A template selection formula allows project administrators to define which set of properties should be used by ReviewTrack for each model. It is also possible to have more than one Field Template at the same time.



Adding, editing or deleting each comment is also available from this panel by right-clicking on an item in the tree view.

Another feature in ReviewTrack 2015 is the Tag Editor. Unlike Navisworks redlines, ReviewTrack offers a rich tag editor to add, edit and remove lines, boxes, circles, etc. The user can also add texts with different fonts with different formats and sizes.



ReviewTrack Tag Editor uses a snapshot of the ViewPoint as the background and stores each element as a vector graphic object. This snapshot could be updated if needed by right-clicking on the ViewPoint name and selecting the “Update Snapshot” menu item.

20.2 ReviewTrack Security

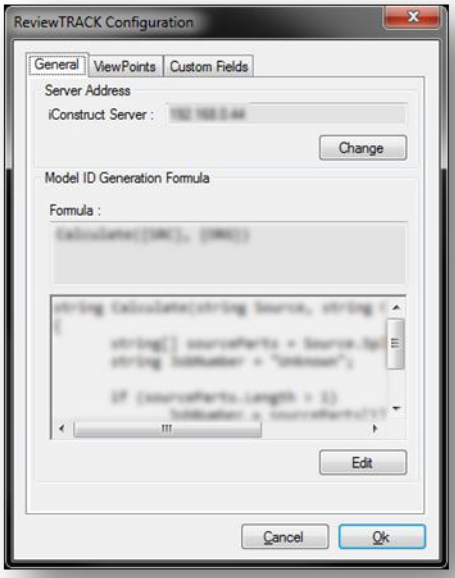
ReviewTrack implements two levels of security: ‘ReviewTrack Administrator’ and ‘ReviewTrack User’. ReviewTrack administrator is granted access to configure the client settings, field definition and field templates, while ReviewTrack User is allowed to use ReviewTrack to read and write data.

All the security settings are saved in the ReviewTrack database and are configurable using the iConstruct Client application [see section ‘iConstruct Client ‘].

20.3 ReviewTrack Configuration

Before using ReviewTrack, the user must ensure that the client settings are correct, and that the settings and field definition settings of this module are adequate and compatible with their projects environment. These settings are accessible via the ReviewTrack Configuration window.

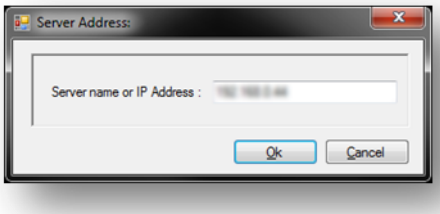
Configuration settings are accessible from ReviewTrack ViewPoints toolbar (as described earlier) or from the ReviewTrack Configuration icon in the ‘General Configuration’ section of the main iConstruct window.



Note: Change permission is only available for ReviewTrack administrator group members.

20.3.1 Server Address

The iConstruct Server Address is the IP Address or network name of the computer running the iConstruct Server Service and ReviewTrack server. ReviewTrack admin can change the server address if required by pressing the 'Change' button:



20.3.2 Model ID Generation Formula

As is described in the 'Concept', ReviewTrack has an internal method to generate unique identifiers for each model. The formula uses C# syntax to generate the model ID. This formula has two parts: 'Command' and 'User Defined Functions'. By default the settings for this formula are:

Formula:

```
Calculate({SRC}, {ORG})
```

User Defined Functions:

```
string Calculate(string src, string org)
{
        return src;
}
```

The 'Formula' (in the first box) is calling the 'Calculate' method from the 'User Defined Functions' (second box). This method has two parameters "(string src, string org)". The arguments used in the formula to fulfil required parameters of the 'Calculate' method are specified as "({SRC}, {ORG})". These two values ({SRC} and {ORG}) are ReviewTrack reserved arguments.

In the run time, ReviewTrack reads the Source File Name ({SRC}) and the Original File Name ({ORG}) of the given Model and replaces these two arguments with the actual values, then calls the 'Calculate' method.

As may have been noticed, the return value of the 'Calculate' method is 'src' in this sample. This means by default ReviewTrack assumes that each model having a specific Source File Name to be considered as a unique Model. Another way to achieve the same result would be:

Formula:

```
{SRC}
```

User Defined Functions:

```

```

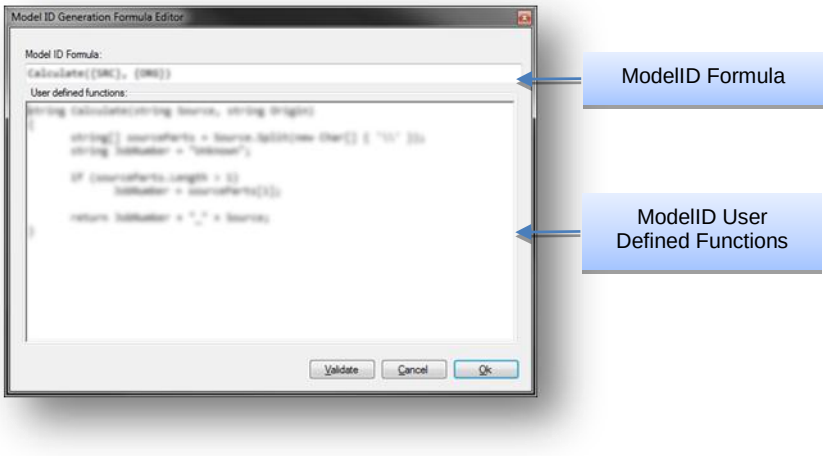
This combination means the formula returns 'Source File Name' without using any 'User Defined Functions'.

This is just a sample use of this feature. ReviewTrack admins should customize their own formula and functions to achieve the best and accurate result suitable for their own project environment before using ReviewTrack.

Note for advanced users: The scripting syntax used in ReviewTrack is C#.NET, therefore all .NET classes and objects can be used and defined in the following namespaces:

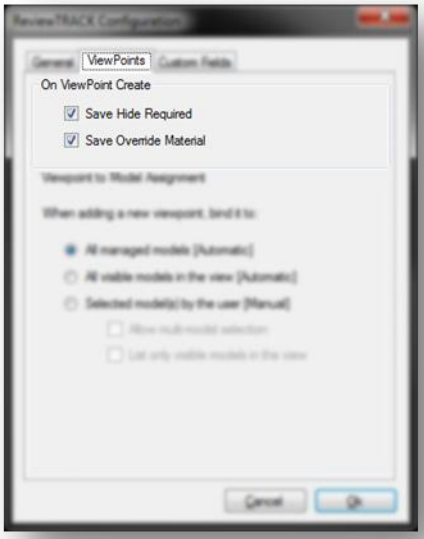
- System
- System.Xml
- System.Data
- System.Data.SqlClient
- System.Windows.Forms
- System.Drawing
- System.IO

Note: ReviewTrack provides a simple Formula Editor with validation functionality. To edit the formula and user defined functions, click on the 'Edit' button under the formula section in the Configuration window:



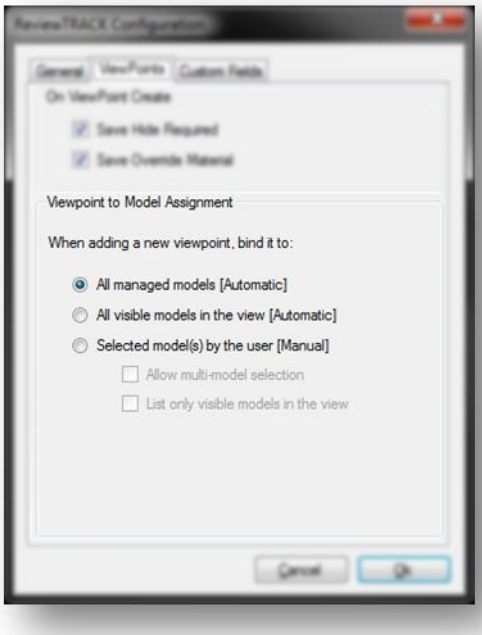
20.3.3 ViewPoint 'Save Hide Required' and 'Save Override Material'

Navisworks ViewPoints uses the 'Save Hide Required' and 'Save Override Material' features to store the visibility and material state of each object while creating a saved viewpoint. These configuration settings offer the same functionality to enable material and visibility saving while creating new ReviewTrack ViewPoints.



20.3.4 ViewPoint Creation Model Assignment

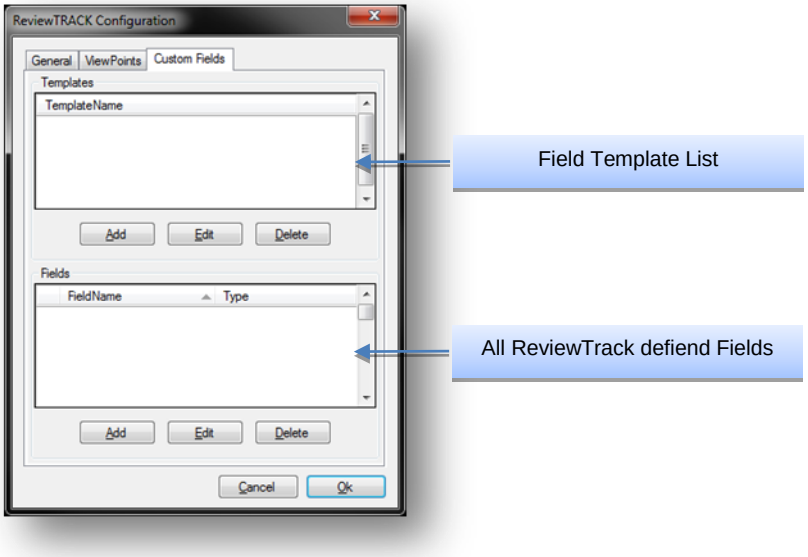
Each model in ReviewTrack has its own unique identifier. Also it is very common to have multiple models appended or merged in one instance of Navisworks. This means when creating a new Folder or ViewPoint, there should be a way to let ReviewTrack know which Model(s) the new ViewPoint should belong to. These settings can be found in the Configuration window:


Viewpoint to Model Assignment
When adding a new viewpoint, bind it to:
All managed models [Automatic]
All visible models in the view [Automatic]
Selected model(s) by the user [Manual]
Allow multi-model selection
List only visible models in the view

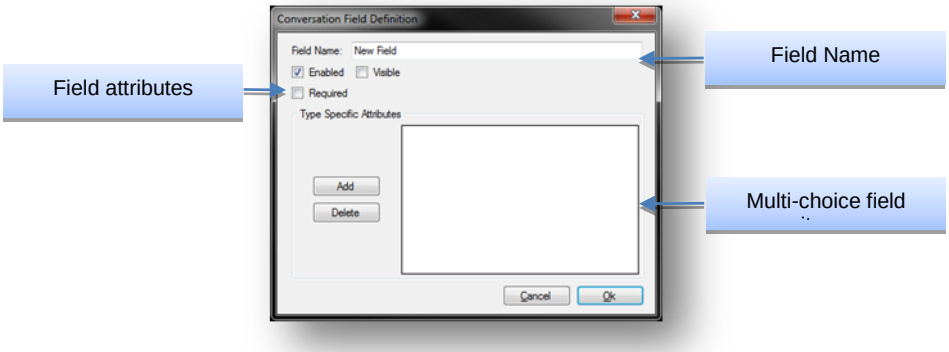
- All managed models [Automatic]: ReviewTrack automatically adds the newly added ViewPoint to all the managed open models.
- All visible models in the view [Automatic]: Only available in Navisworks 2014, tells ReviewTrack to bind the ViewPoint to any model that has at least one object visible in the view port.
- Selected model(s) by the user[Manual]: Allows users to select the model(s) manually
    - Allow multi-model selection: If checked users can select multiple models.
    - List only visible models in the view: Only available in Navisworks 2014, if selected the user can select model(s) from visible models in the current view port.

20.3.5 Custom Fields and Template Definition

One of the most important configuration functions of ReviewTrack is Custom Fields, it allows users to have as many fields with different types and settings as they need. It uses Templates to classify fields and Formulas, and User Defined Functions to select appropriate Template(s) to use in different situations based on the settings of each opened model(s).



To add a new Field Press the 'Add' button, a menu will display to select the type of field the user want to add. Existing supported types are: 'String', 'Integer', 'Double', 'Boolean', 'DateTime', 'Multi-Choice', and 'GUID'. Clicking on each of these types displays a new window to set the properties for the new field. For example if a multi-choice field is chosen:



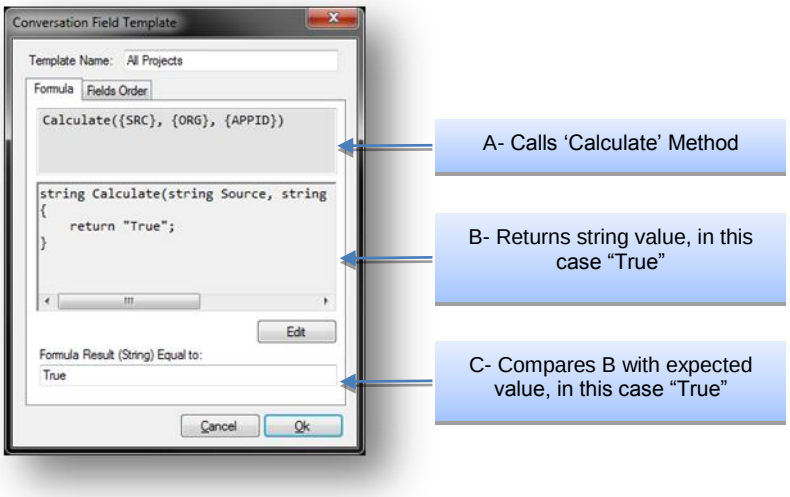
After defining all required fields, a Template needs to be created to assign fields to. A Template is a set of Fields which has a selection formula and an order of display. The selection Formula and User Defined Functions are the same as Formula and Function described in the Model ID Generation Section. The only difference in the Template formula is that a new ReviewTrack reserved argument ({APPID}) is used for internal purposes and the user can simply ignore this. The default value for a template is:

Formula:

```
Calculate({SRC}, {ORG}, {APPID})
```

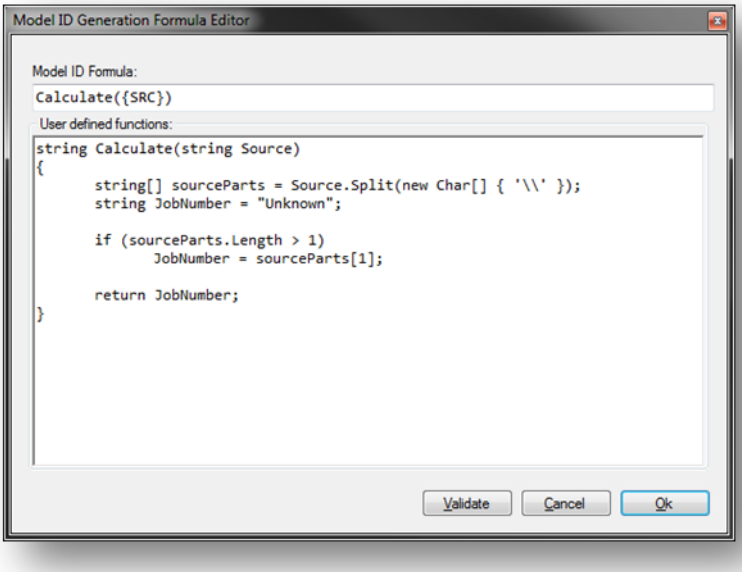
User Defined Functions:

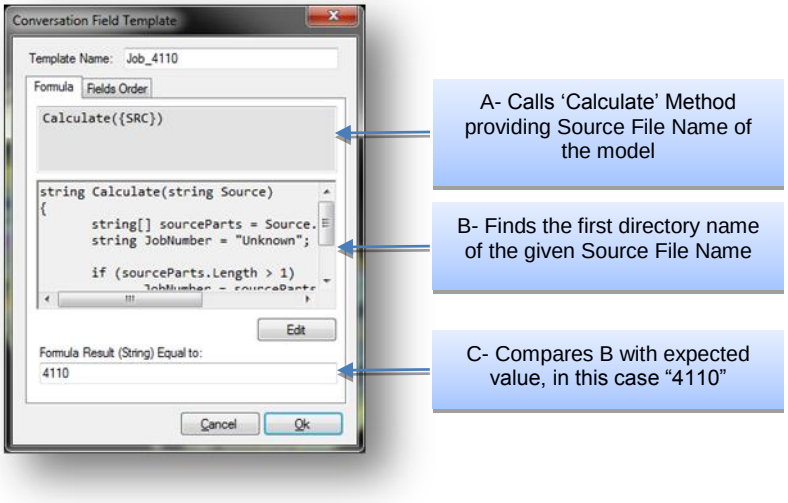
```
string Calculate(string Source, string Original, string ApplicationID)
{
    return "True";
}
```



The 'Formula' will be calculated and the result will be compared by the defined value

The above settings simply mean that the formula always returns "True" which tells ReviewTrack to use this template for every Conversation in every model. A more complex setting for the Template Formula and Functions could be something like this:





The above formula finds the first directory name of the given 'Source File Name' and compares with '4110', if they are equal for the given model then the template will be used for its conversations.

Notes:

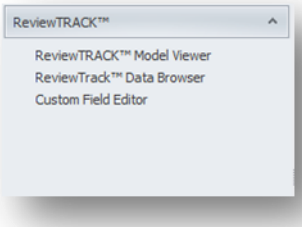
1- When importing legacy Naviswoks comments, the body of the comment will be used as the subject of the ReviewTrack conversation.
2- ReviewTrack does not have any predefined fields or templates; it is up to the ReviewTrack administrator to define fields and templates based on the team requirements.

20.4 ReviewTrac Stand-alone Client

iConstruct 2015 introduces iConstruct Client application, which provides four main functionalities:

- Job Management System
- User Management
- Template Management
- ReviewTRACK Client

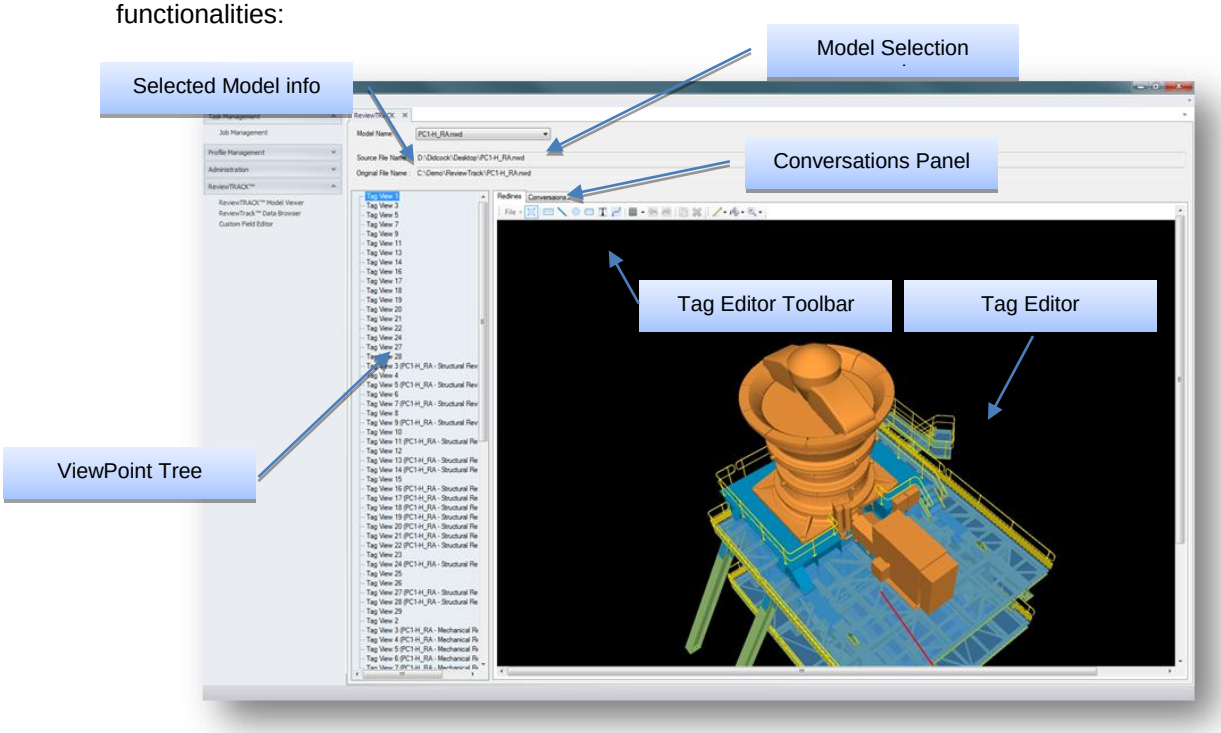
ReviewTrack client allows users to access all ReviewTrack information without running Navisworks.

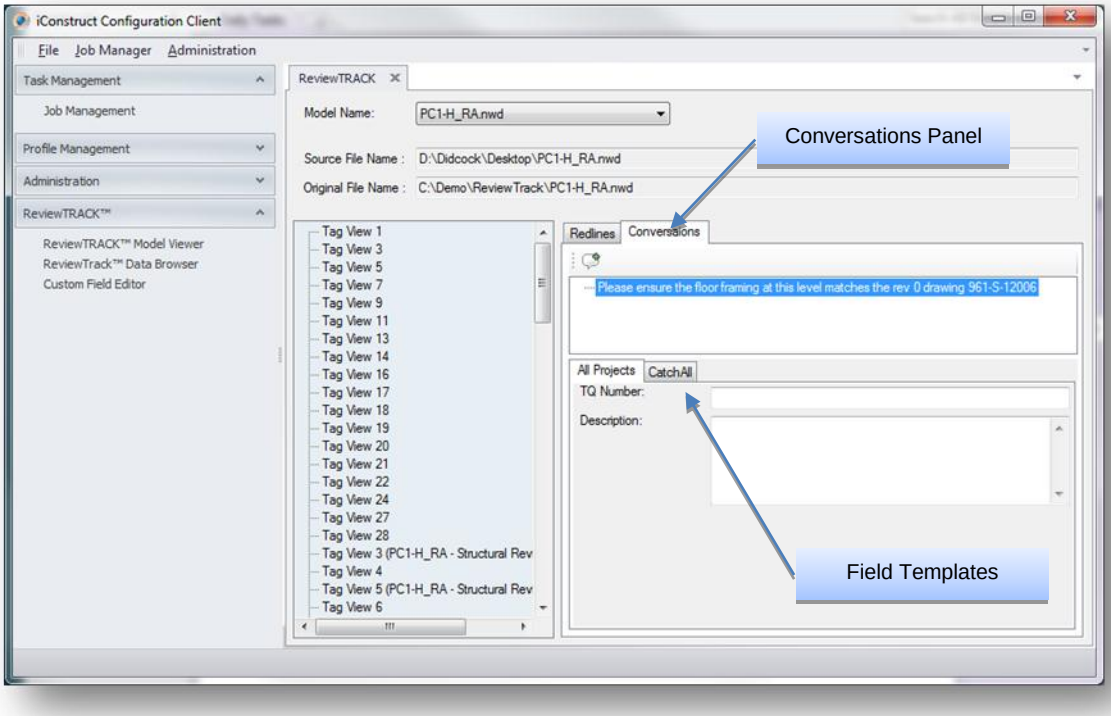


There are three functionalities available in the ReviewTrack stand-alone client:

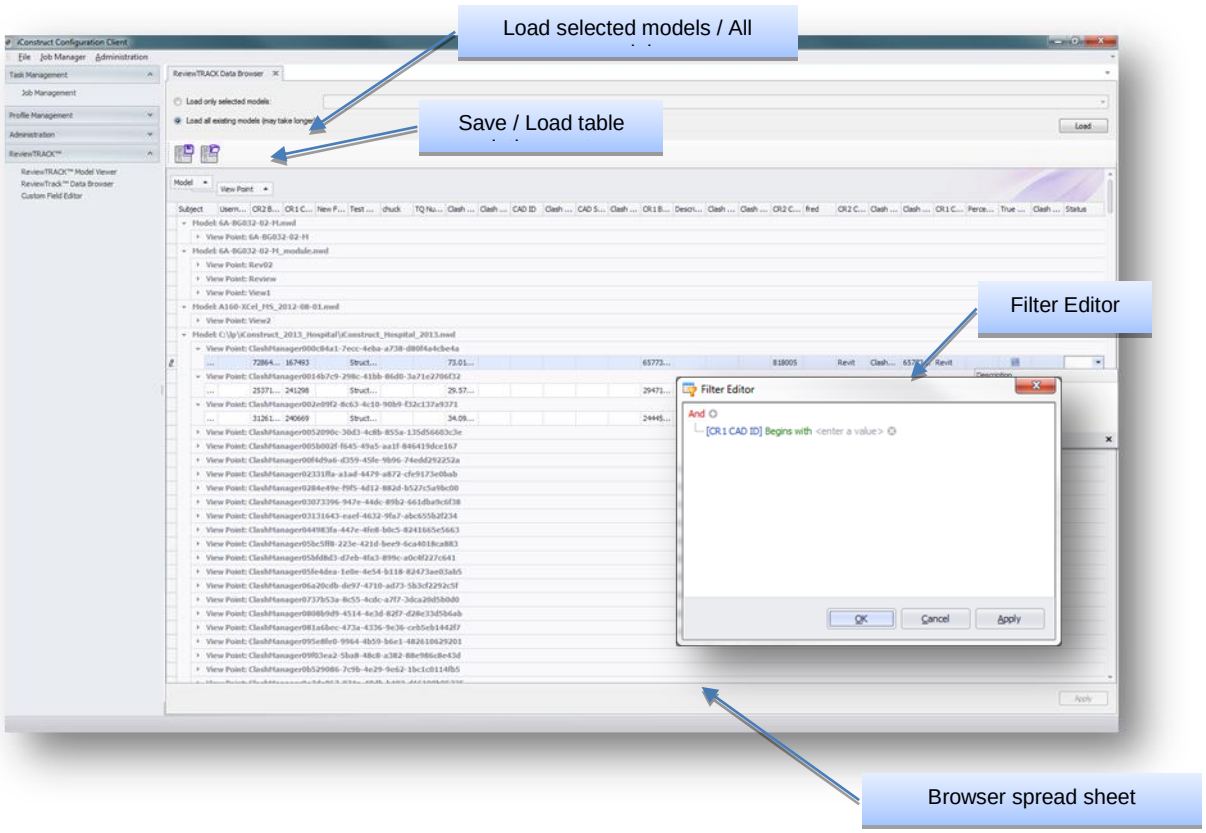
- ReviewTrack Model Viewer
- ReviewTrack Data Browser
- Custom Field Editor

The ReviewTrack Model Viewer provides a rich model browser with the exact same ReviewTrack functionalities:



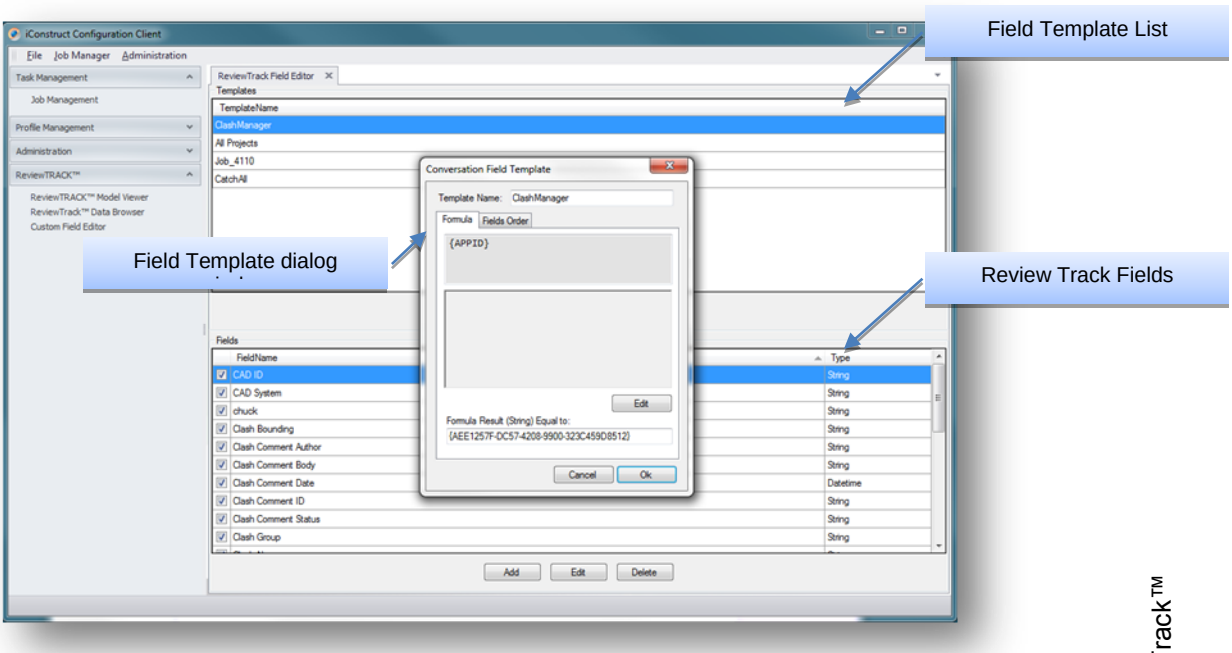


The second option is ReviewTrack Data Browser. This feature allows users to browse all conversation field values of stored models in a spread sheet like view:



The browser table has the functionalities to group, filter, select, sort, and hide columns. Users can also save the layout template including groupings and filters to use in the feature.

The last option in ReviewTrack client is 'Custom Field' editor. This tool allows ReviewTrack administrators to edit custom fields and Field Templates:



20.5 Installing ReviewTrack™ Server

ReviewTrack Server is running under the newly introduced iConstruct Server 2014. This means the server should be installed on the same machine as the iConstruct Server. Each of these features has their own database requirements. iConstruct Server installer creates an 'iConstruct' database on the specified SQL Server instance as does ReviewTrack Server. It is highly recommended to install and configure iConstruct Server in an isolated environment rather than the user's personal workstation. Also it is recommended to install these services by a system administrator as it involves SQL Server configuration.

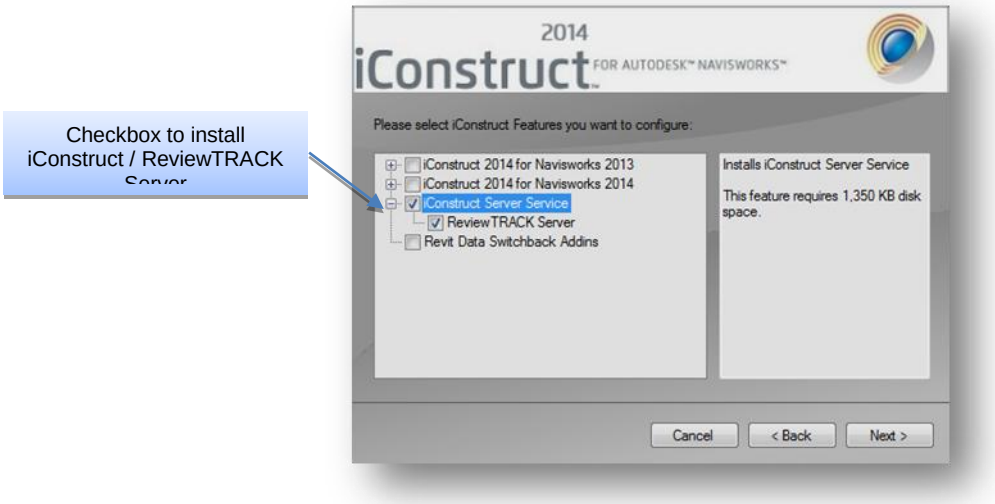
To Install and configure ReviewTrack™ a knowledge of basic concepts of SQL Server installation/management is essential, and administrative access to the server is required.

ReviewTrack™ installation is via the iConstruct setup wizard. The client will be installed automatically with iConstruct on client machines. The server should be installed on a computer with the following prerequisites:

- Microsoft .NET Frameworks 4.5 [1]
- Microsoft SQL Server 2008 or later (Standard / Enterprise / Workgroup / Express) [2]

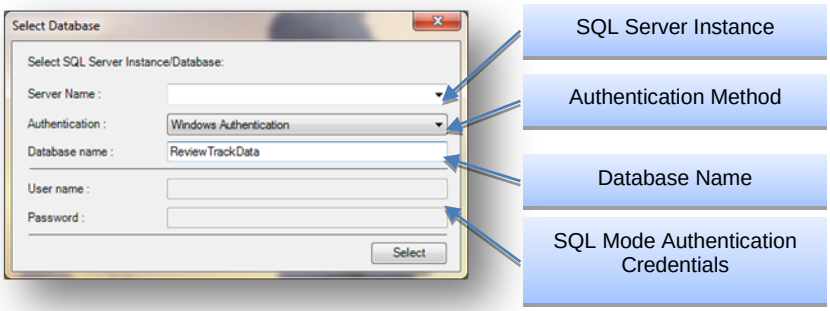
Note 1: It is always recommended to not install the ReviewTrack™ server on a client machine, as this could cause loss of data as client machines are not as protected as servers.

To install ReviewTrack™ Server, run the iConstruct Setup on the server with all requirements installed. In the feature selection form, please unselect all of the features except iConstruct Server Service node and ReviewTRACK Server.


Checkbox to install iConstruct / ReviewTRACK Server
2014
iConstruct FOR AUTODESK™ NAVISWORKS™
Please select iConstruct Features you want to configure:
iConstruct 2014 for Navisworks 2013
iConstruct 2014 for Navisworks 2014
iConstruct Server Service
ReviewTRACK Server
Revit Data Switchback Addins
Installs iConstruct Server Service
This feature requires 1,350 KB disk space.
Cancel
< Back
Next >

After finishing the wizard, setup will start installing files. During database installation a popup window will ask for the name and instance of the SQL server with authentication settings. Please note that although it is possible to install each of the server modules (Database and Services) on different machines, it is recommended to install all modules on the same server to increase database access speed:

[1] http://www.microsoft.com/en-us/download/details.aspx?id=22833
[2] http://msdn.microsoft.com/en-us/library/ms143219(v=sql.100).aspx



Select or type the SQL server instance in the 'Server Name' box and specify the name of the database to store ReviewTrack™ data.

To access SQL Server during ReviewTrack™ Setup, authentication information must be provided along with the rights to install a database: during SQL server setup, an authentication mode for the Database Engine must be selected. There are two available modes: Windows Authentication and mixed mode. Windows Authentication mode enables Windows Authentication and disables SQL Server Authentication. Mixed mode enables both Windows Authentication and SQL Server Authentication. Windows Authentication is always available and cannot be disabled.[3]

Note: It is always recommended to use "Windows Authentication" mode.

After providing the required information, setup will install the database and Service to run iConstruct Server and ReviewTrack Server. By default the current user (the user which is running the setup) will be added to the iConstruct Administrator Group. This group has full permissions on all iConstruct sections including defining new users and groups and giving necessary permissions to groups and users.

[3] http://technet.microsoft.com/en-us/library/ms144284.aspx

21 Revit Data Switchback

Revit Architecture is a Building Information Modelling software developed by Autodesk. It allows the user to design with both parametric 3D modelling and 2D drafting elements. In addition, Revit's database for a project can contain information about the project at various stages in the building's lifecycle, from concept to construction to decommissioning. Revit allows the user to store additional information through its application programming interface (API) as well as the user interface.

Storing data into the model is also available in Navisworks. In this case, if the Navisworks model is generated from the Revit model, custom tabs and properties could be accessible from the property tab in Navisworks, although this is useful, it is not enough. In most cases new properties and user data is being added to the Navisworks model using iConstruct's Append Data module or by adding property tabs directly from Navisworks. In either case it is important to sync this user data with the Revit model.

21.1 Concept

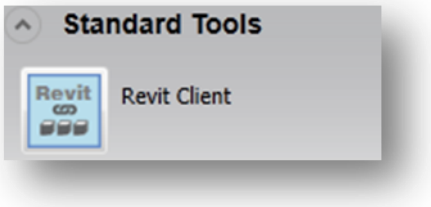
Due to the need to store building information across multiple applications and models, the need for synchronizing information from different modelling systems has arisen. Revit Data Switchback provides the solution to push data back to the Revit model from the Navisworks model using iConstruct.

The solution relies on the 'Shared Parameter' storage area of the Revit model to store custom user data. This system consists of two modules: first is an add-in module for iConstruct which gathers data from the Navisworks model and the second one is an add-in module for Revit which receives data and applies it to the selected Revit model.

The communication system between the two modules is via the Windows Communication Framework service which runs under the Revit module process. The communication is implemented in a one way form, from Navisworks to Revit.

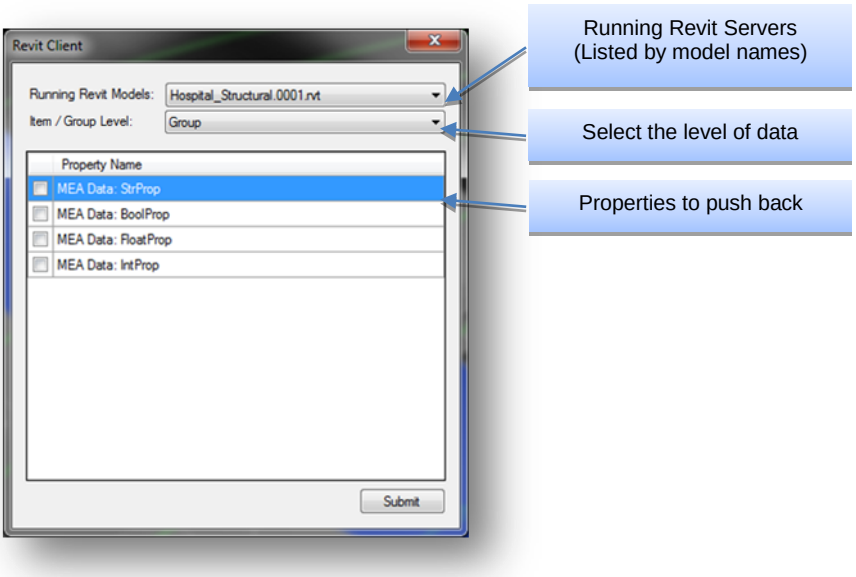
21.1.1 Client Side

Revit Client installs as a plug-in within iConstruct 2015 standard tools. It uses iConstruct APIs for generating user interface and also data gathering from the model.



To create a user data property, the user can use the 'Append Data' tool of iConstruct (See Append Data section). Other custom properties or new Data Tabs can be added to the model using Navisworks standard tools.

When running the Revit Client module, all the custom user data properties of the selected elements in the model will be listed. The user can check any number of the properties that need to be sent to the Revit model for syncing:



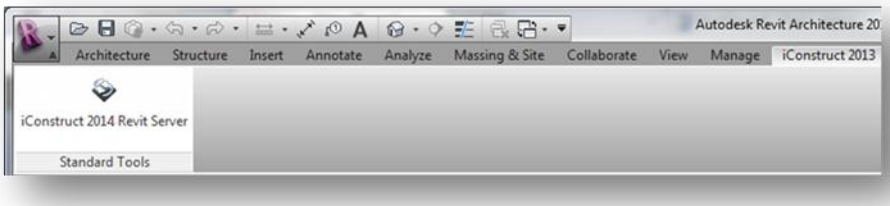
At the top of the page there is a list of currently running Revit Servers. If there's no Revit server open, the list will be empty. The 'Item/Group Level' option allows users to select the Item or Group level properties for the selected item.

After selecting properties, by pressing the 'Ok' button, the user data of the selected objects and elements will be gathered by the Revit Client and pushed back to the Revit server module.

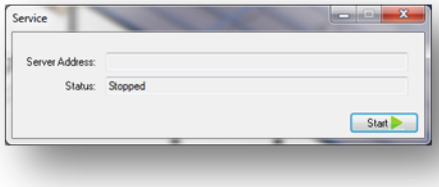
21.1.2 iConstruct 2015 Revit Server

As mentioned previously, Revit has the capability of storing user data in the model. The methods for storing data in the Revit model are provided by the API i.e. Shared Parameters and Extensible Storage Area. The Revit Server module uses the Shared Parameter method for pushing data into the model. To do so, it is necessary to define the parameter schema in the definition file associated with the model. This file will be created as soon as running the module for the first time on the model.

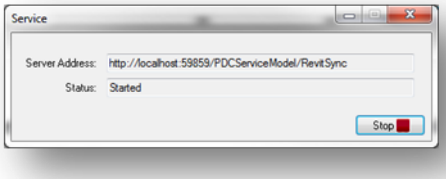
The Revit Server module is part of the Revit Add-ins tab:



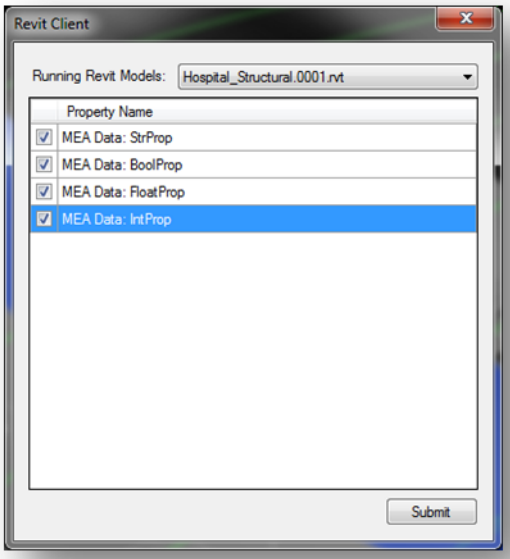
Executing the module opens the following window:



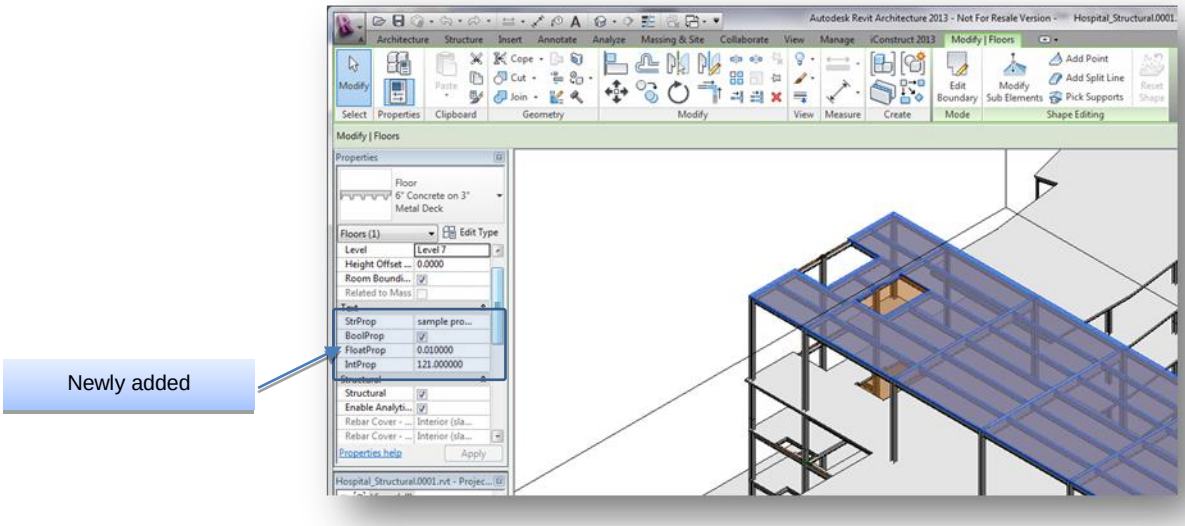
To start the server, the user must click on the 'Start' button. The server will find an empty network port to use for this instance of Revit.



After running the server module, Revit Client (iConstruct plugin) can find the server and push data:

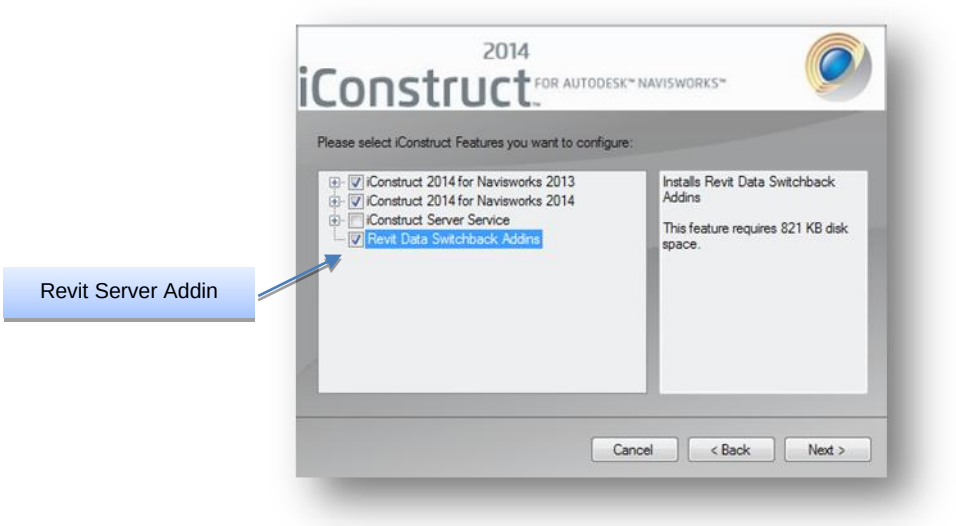


By pressing 'Ok' the Revit model will be updated as below:



21.2 Installation

The Revit Data Switchback has two parts, the client part installs as an iConstruct 2015 module and the server side installs as a Revit add-in during the iConstruct setup process. Installing the Revit server add-in is not mandatory, so please make sure the 'Revit Switchback Server' feature has been selected during setup:


Revit Server Addin
2014
iConstruct FOR AUTODESK™ NAVISWORKS™
Please select iConstruct Features you want to configure:
iConstruct 2014 for Navisworks 2013
iConstruct 2014 for Navisworks 2014
iConstruct Server Service
Revit Data Switchback Addins
Installs Revit Data Switchback Addins
This feature requires 821 KB disk space.
Cancel
< Back
Next >

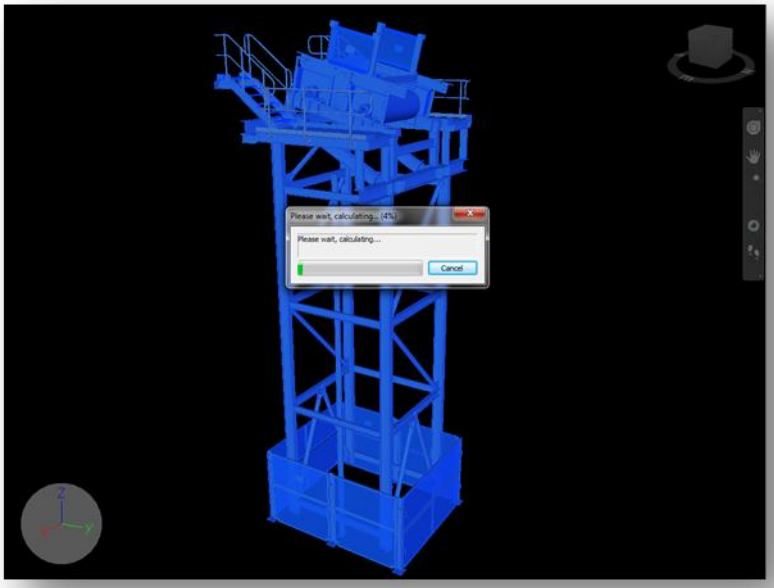
Revit Server works with 2012, 2013, and 2014 versions of Autodesk Revit Architecture.

22 Center of Gravity (COG)

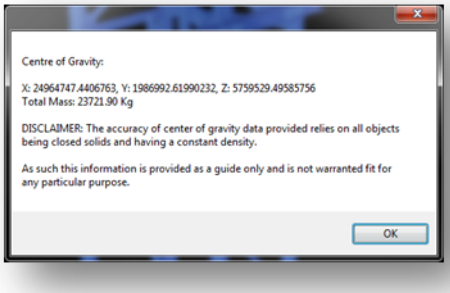
A new tool for construction professionals allows an accurate Center of Gravity to be calculated and displayed in the model for dimensioning using Navisworks redline mark-up tools and producing reports via iConstruct's Export View report engine. Given accurate geometry and nominating a mass property, this routine calculates the center of gravity for estimation purposes prior to site work.

22.1 Concept

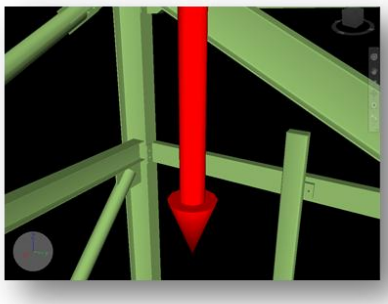
To run the Center of Gravity module on a collection of objects in a model, select those objects with Navisworks selection tool, then run ‘Center of Gravity’ from Standard Tools:



After finishing the COG calculation, a new window opens containing COG coordination information with an estimated total mass for the selected objects:

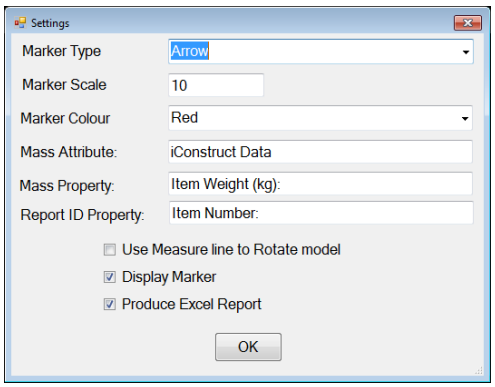

Centre of Gravity:
X: 24964747.4406763, Y: 1986992.61990232, Z: 5759529.49585756
Total Mass: 23721.90 Kg
DISCLAIMER: The accuracy of center of gravity data provided relies on all objects being closed solids and having a constant density.
As such this information is provided as a guide only and is not warranted fit for any particular purpose.
OK

The COG position for the selected objects will be displayed as a marker in the model:



22.2 Configuring Center of Gravity

Open “Center of Gravity Configuration” from the “General Configuration” section:



This module can be configured using the following options:

Marker Type: changes the way the marker should display the COG coordinates in the model: Arrow, Cross, or Sphere.

Marker Scale: Adjust to suit

Marker Colour: Select a contrasting colour

Mass Attribute: if the mass property of each part in the model is stored, this setting indicates the attribute containing the mass value

Mass Property: the property which contains the value of the mass in the model

Report ID Property: The property to use from the model as the ID in the report (required if a report is to be produced).

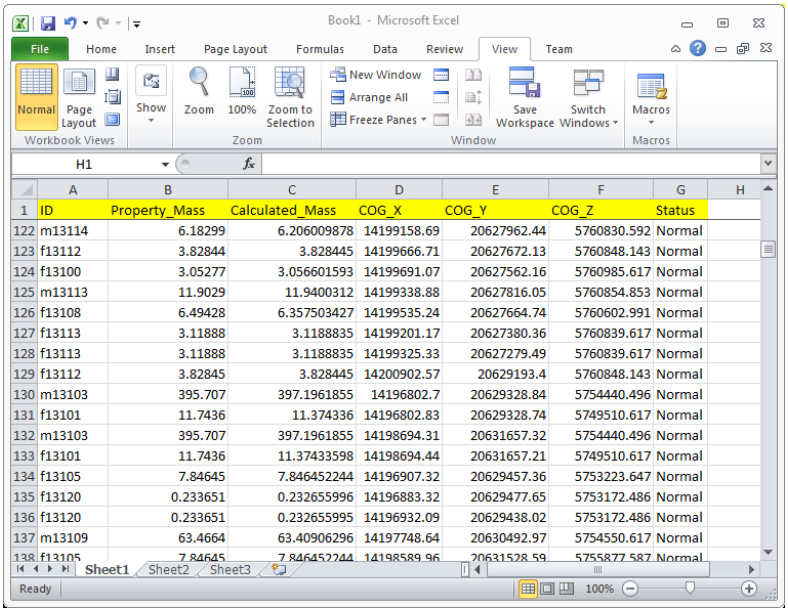
Use Measure line to Rotate Model: If the user is going to produce a dimensioned view using ‘Module Dimension’ after using COG, ticking this will align the model to world right-axis. Just use the measure tool to measure a line along the required square axis and the user will be prompted to allow auto-rotation if the model is not already square.

Display Marker: Enables display of the chosen marker, otherwise just a message box is displayed.

Produce Excel Report: Once complete, a report listing the calculated vs detected mass, along with the status of each COG calculation is returned.

Note: if the mass property / attribute is not specified or is empty, the COG routine will calculate the mass of objects based on 7850 Kg per 1 cubic meter (steel density factor).

Below is an example of an excel report.



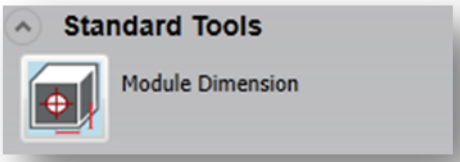
	A	B	C	D	E	F	G	H
1	ID	Property_Mass	Calculated_Mass	COG_X	COG_Y	COG_Z	Status	
122	m13114	6.18299	6.206009878	14199158.69	20627962.44	5760830.592	Normal	
123	f13112	3.82844	3.828445	14199666.71	20627672.13	5760848.143	Normal	
124	f13100	3.05277	3.056601593	14199691.07	20627562.16	5760985.617	Normal	
125	m13113	11.9029	11.9400312	14199338.88	20627816.05	5760854.853	Normal	
126	f13108	6.49428	6.357503427	14199535.24	20627664.74	5760602.991	Normal	
127	f13113	3.11888	3.1188835	14199201.17	20627380.36	5760839.617	Normal	
128	f13113	3.11888	3.1188835	14199325.33	20627279.49	5760839.617	Normal	
129	f13112	3.82845	3.828445	14200902.57	20629193.4	5760848.143	Normal	
130	m13103	395.707	397.1961855	14196802.7	20629328.84	5754440.496	Normal	
131	f13101	11.7436	11.374336	14196802.83	20629328.74	5749510.617	Normal	
132	m13103	395.707	397.1961855	14198694.31	20631657.32	5754440.496	Normal	
133	f13101	11.7436	11.37433598	14198694.44	20631657.21	5749510.617	Normal	
134	f13105	7.84645	7.846452244	14196907.32	20629457.36	5753223.647	Normal	
135	f13120	0.233651	0.232655996	14196883.32	20629477.65	5753172.486	Normal	
136	f13120	0.233651	0.232655995	14196932.09	20629438.02	5753172.486	Normal	
137	m13109	63.4664	63.40906296	14197748.64	20630492.97	5754550.617	Normal	
138	f13105	7.84645	7.846452244	14198589.96	20631528.59	5755877.587	Normal	

23 Module Dimension

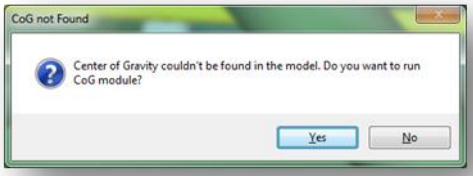
Applying dimension lines or calculating distances between two specific points in a Navisworks model is almost impossible. This is due to the nature of the Navisworks architecture which does not allow users to pick points, draw lines or dimensions as easily as AutoCAD. Module Dimension overcomes this.

23.1 Concept

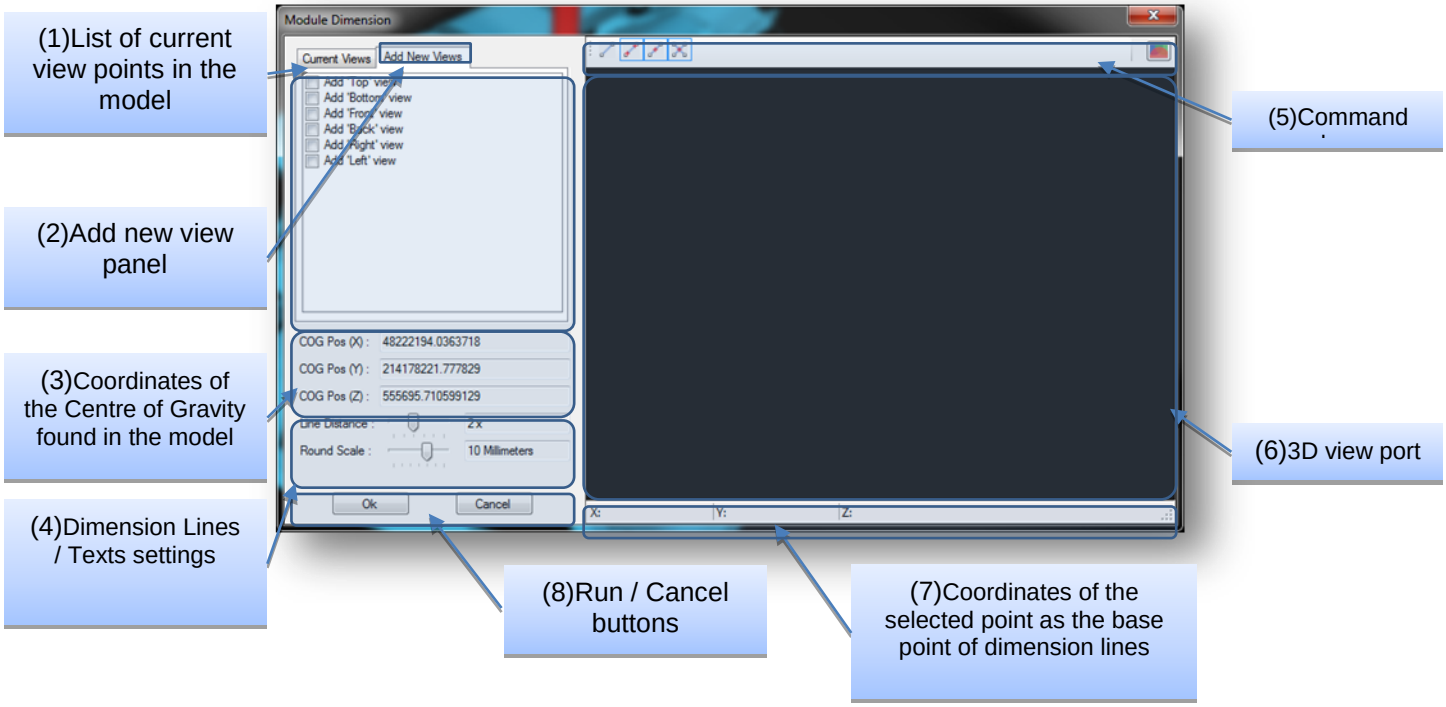
Module Dimension is a 3D enhanced module allowing users to draw dimensions from a selected base point within the model to the Centre of Gravity point calculated by the iConstruct 'COG' plugin. It allows users to pick any Navisworks object, draw lines between two selected nodes, and pick any point as the base point from a variety of options, including end/start points, mid points or intersections of lines, in a user friendly window.



This module is completely dependent on the COG module of iConstruct to draw dimension lines. The COG module stores these coordinates in an additional user defined tab for the marker object which indicates the centre of gravity. These values will be used by the Module Dimension plugin to draw dimension lines. By running the module, if these values could not be found in the model, the module asks the user if they want to run the COG module first.

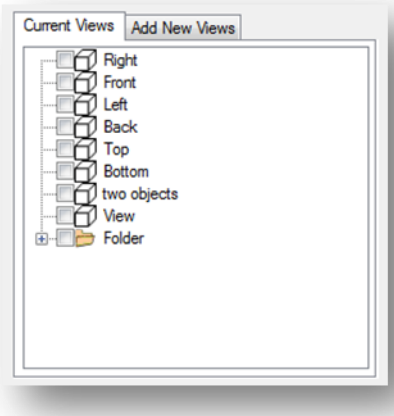


After finding the proper COG coordinates, the main form will be shown. This form consists of several parts:

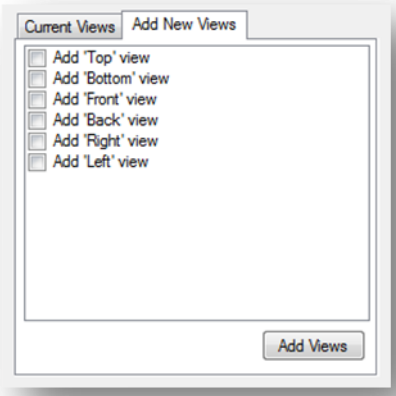

(1)List of current view points in the model
(2)Add new view panel
(3)Coordinates of the Centre of Gravity found in the model
(4)Dimension Lines / Texts settings
(5)Command
(6)3D view port
(7)Coordinates of the selected point as the base point of dimension lines
(8)Run / Cancel buttons
Module Dimension
Current Views
Add New Views
COG Pos (X) : 48222194.0363718
COG Pos (Y) : 214178221.777829
COG Pos (Z) : 555695.710599129
Round Scale :
10 Millimeters
Ok
Cancel

1- View Point Selection Panel
2- COG Coordinates
3- Dimension Lines / Texts settings
4- Command Bar
5- 3D View Port
6- Selected Base-Point Coordinates
7- Run/Cancel

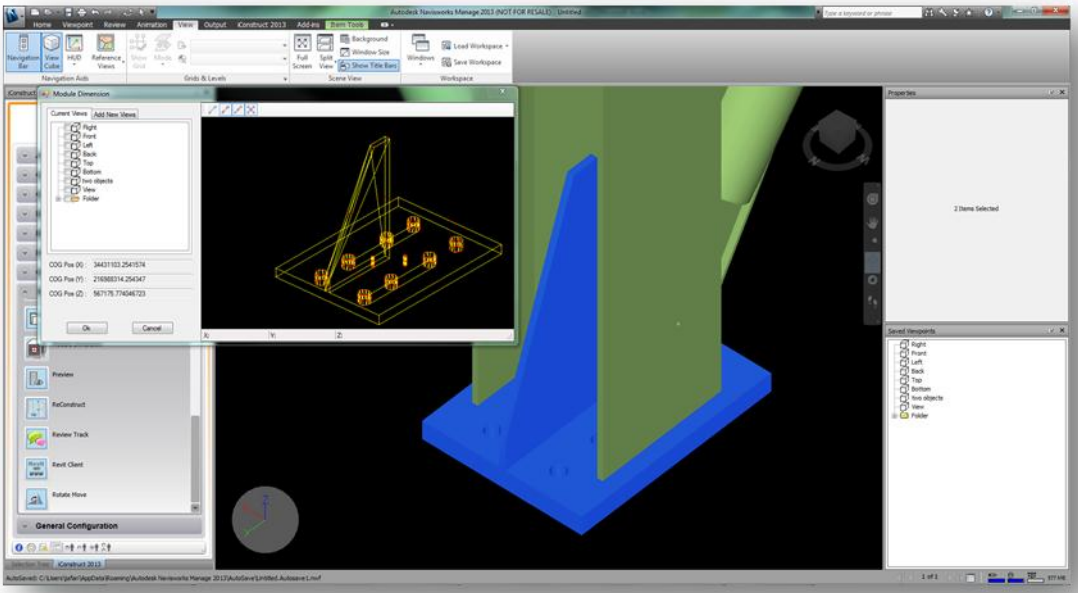
The View Point Selection Panel displays all the saved viewpoints of the current model. The user may select one or more viewpoints from this tree-view to draw dimension lines on that view. Note that the dimension can only be drawn on Orthographic viewpoints. Perspective viewpoints will be omitted by the Module Dimension.



If there are no (or less) Orthographic viewpoint(s) available in the model than is desired, the user can generate additional viewpoints using the 'Add New Views' tab. In this tab, the user can select one or more views from a list of six different available options and press the 'Add Views' button to generate the views automatically.



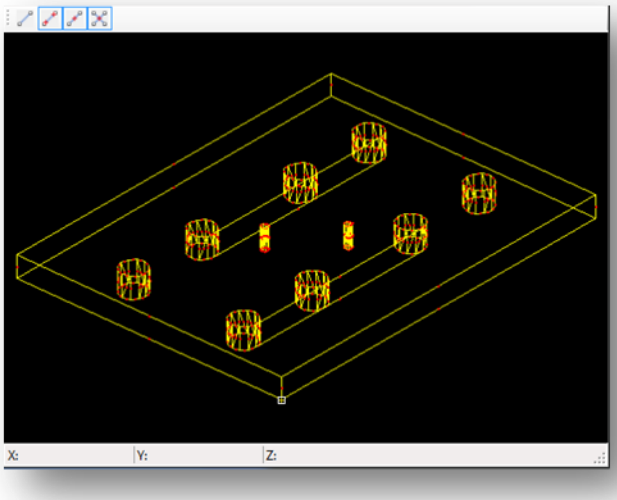
The next step to generate a dimension line is to select a base point. To select a base point the user needs to select an object in the model, for example a base plate. By selecting any object or group of objects, a wire frame view of selected object(s) will be displayed in the '3D View Port' and those objects will be focused automatically:



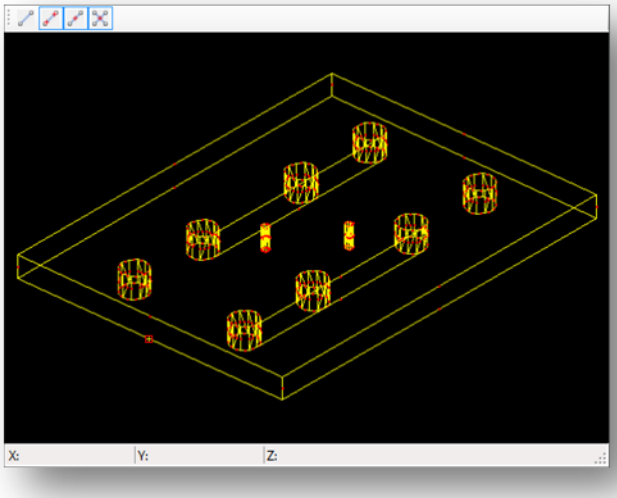
In this 3D view port, the user can select a point as base point of dimension lines. There are three options for selecting a point: end point, mid-point, or the intersection point of 2 lines.

There are 4 command buttons available in the command bar:

By running the module for the first time, the ‘End-Point’, ‘Mid-Point’ and ‘Intersection’ buttons are enabled by default. This means if the user moves the mouse cursor over any endpoint of any line, the selection box (white box) will appear and the user can select that end point:

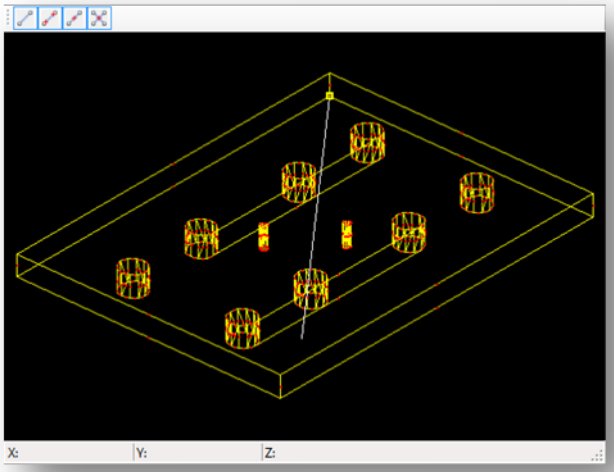


The red points in this view indicate the Mid-Points of the line, if the ‘Mid-Point’ button is selected in the command bar, the selection box (red box) will appear by moving the cursor near any of the red mid-points:

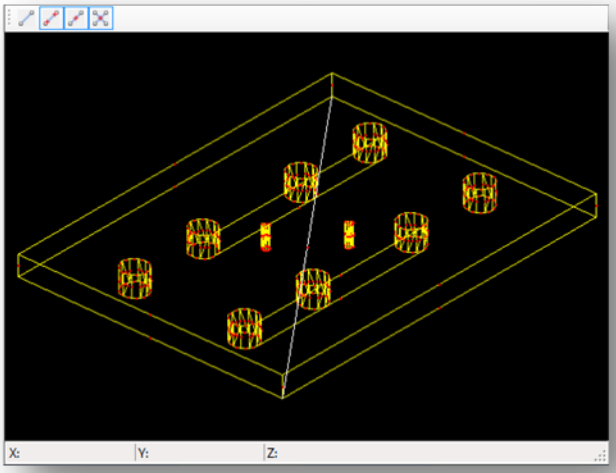


It is also possible to select the intersection points of two lines. Generally this option is useful when the user wants to draw custom lines to expand their selection options.

The ‘Draw Line’ command allows users to pick any two points from the view port and draws a line (white line) between those points:

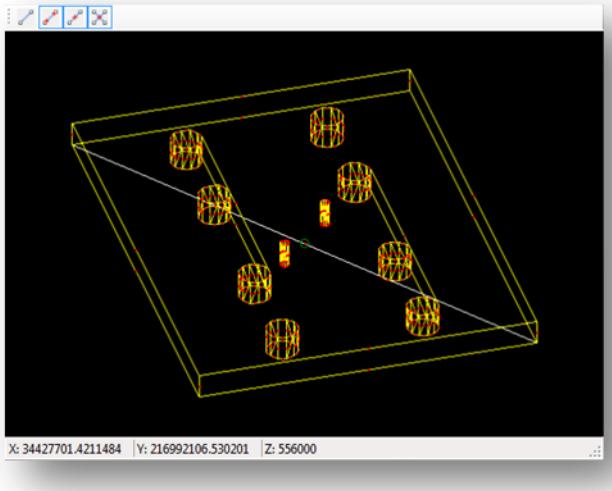


To do so, the user needs to press the ‘Draw Line’ button, then pick the first point, and by selecting the second point, a white line will be drawn between the two selected points:



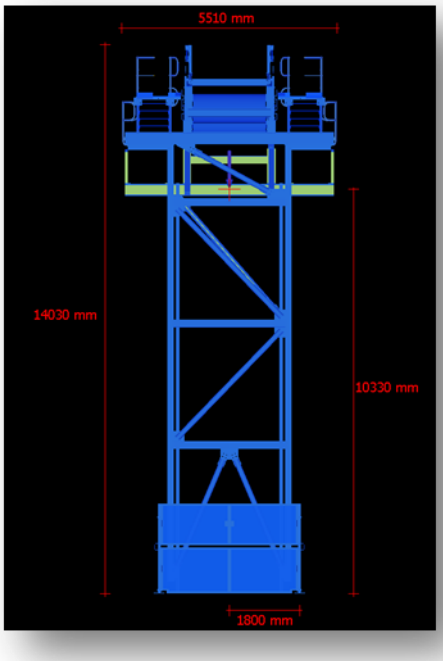
In the above example, the mid-point of white line is the centre of the base plate’s bottom face. Note that if the current selection of objects in the Navisworks model changes, all user defined lines will be erased, however rotating or zooming in/out in the model does not have any effect on the user lines.

To select the base point for drawing the dimension lines, it is only required to move the mouse cursor over the appropriate point and pick that. For the above example, to select the mid-point of a user defined line (white line), the user needs to move the mouse cursor above the red point which indicates the mid-point of the line. A red selection box will appear and the user can select it, causing a Green circle to be displayed and the coordinates of the selected point will be shown at the bottom of the View Port:



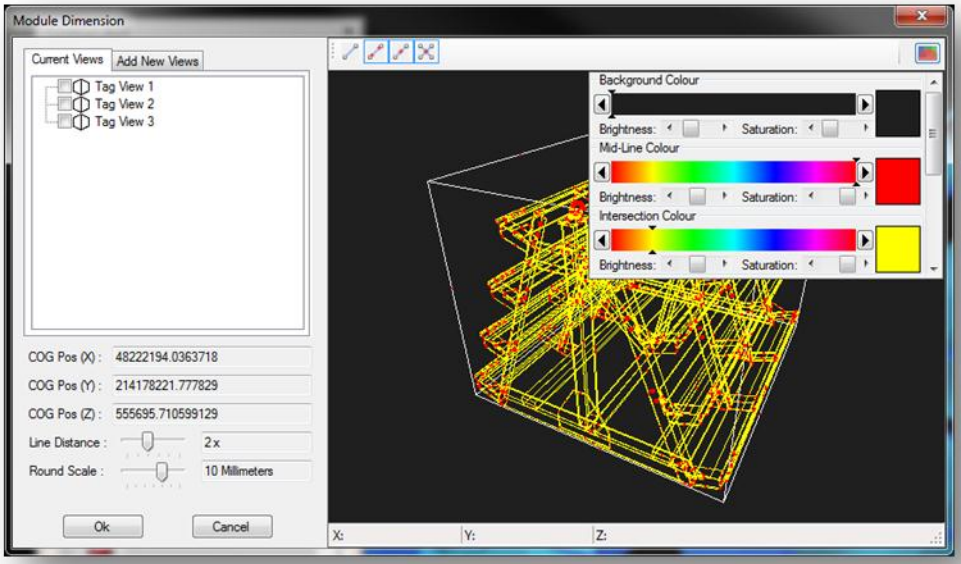
The green circle indicates the position of the selected point as the base point of dimension lines.

After selecting the base point and picking the required viewpoints to draw the dimension lines on, the final step is pressing the ‘Ok’ button. By pressing this button, the plugin starts calculating dimension distances and placing the dimension lines in the selected viewpoints:



Sample dimension lines drawn by the Module Dimension plugin

The Module Dimension module has the colour selection feature which allows users to customize colours for the background, system colour, user line colours as well as selection point colour:

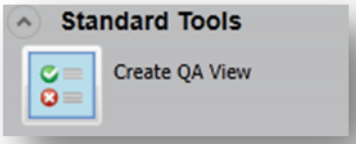

Module Dimension
Current Views
Add New Views
Tag View 1
Tag View 2
Tag View 3
COG Pos (X) : 48222194.0363718
COG Pos (Y) : 214178221.777829
COG Pos (Z) : 555695.710599129
Line Distance : 2 x
Round Scale : 10 Millimeters
Ok
Cancel
Background Colour
Brightness:
Saturation:
Mid-Line Colour
Brightness:
Saturation:
Intersection Colour
Brightness:
Saturation:
X:
Y:
Z:

24 QA View

Users take a lot of time to communicate irregularities and problems with models. Using features such as Viewpoints, comments and iConstruct ViewReport makes this more efficient. Furthermore, iConstruct 2015 ReviewTrack™ makes the collaboration process easy and reliable so that every team member has the same data. The next step in this scenario is standardizing the Viewpoint and Comment generation. The new 'Create QA View' module is being introduced in iConstruct 2015.

24.1 Concept

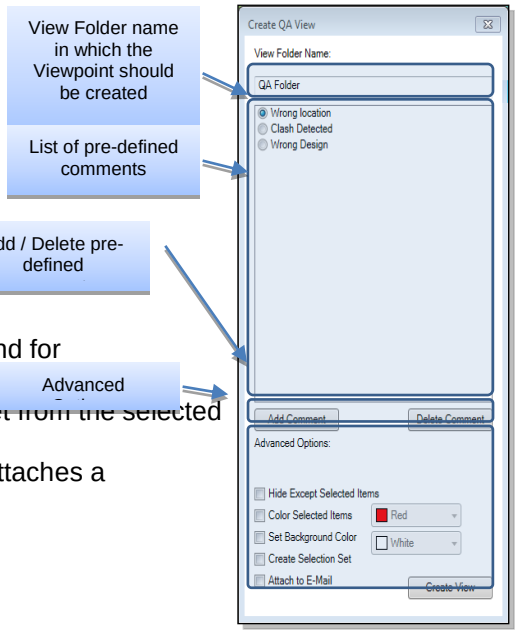
The 'Create QA View' helps users to create viewpoints in the model and use predefined descriptions as comments. This module is part of iConstruct 2015 'Standard Tools'.



Running QA View module opens a new window and initializes iConstruct ReviewTrack™ to send data to ReviewTrack™ if the user wants to integrate the newly created viewpoint and comment in the ReviewTrack™ database.

The QA form consists of 4 sections:

1- QA Folder name, all viewpoints will be generated under this folder.
2- Pre-defined comments list
3- Add/Delete buttons
4- Advanced Options:
   a. Hide Except Selected Items
   b. Colour Selected Items with colour selection tool
   c. Set Background colour: to change the background for snapshot printing
   d. Create Selection Set: creates a new selection set from the selected items
   e. Attach to E-Mail: opens active email client and attaches a snapshot with created viewpoint information



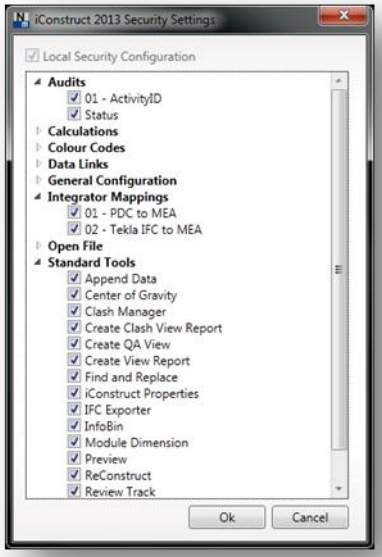
25 Profile Manager

iConstruct is a set of tools and plugins. Each plugin in iConstruct can have multiple templates to do the specific task in a certain way configured by the user. These templates and configuration variables used by plugins and the iConstruct engine are being stored in the registry. In native iConstruct versions users could save or load these registry values into profile files to make backup or import another instance of templates. Although this feature could help users it had a major drawback of merging different profile templates.

25.1 Concept

Profile manager in iConstruct 2015 makes it possible to import, export, clear, and merge different profiles into the current profile. These set of commands can be found on the toolbar at the bottom of the main iConstruct 2015 panel.

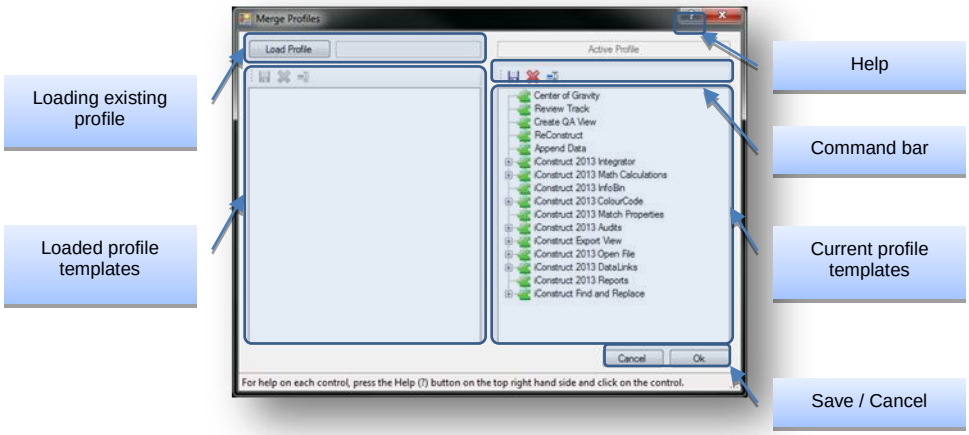
Security configuration in iConstruct 2015 is now improved, enabling security configuration for templates of plugins as well as access for plugin configurations and commands. These settings can be accessed in a user friendly manner.



Security configuration in iConstruct 2015

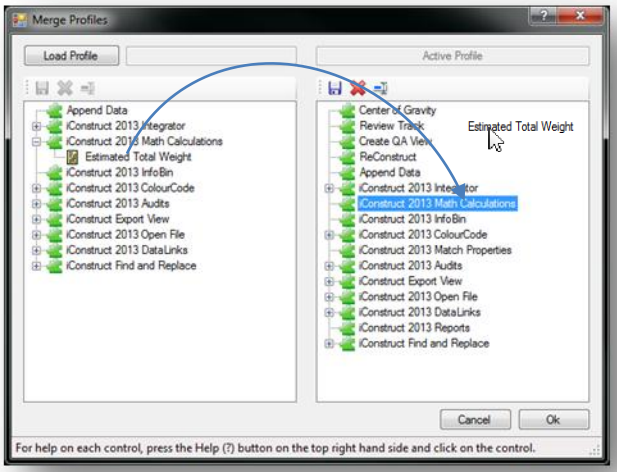
Save, Load and clear profile commands are now upgraded to store templates and configurations of iConstruct plugins in a new structural syntax. This new structure allows iConstruct to import or merge templates of different plugins whether they are internal iConstruct plugins or user defined plugins developed using iConstruct application programming interfaces (API).

Merge profile command is a new tool in iConstruct 2015. Running this command displays a window with following sections:



The right hand tree is a list of current templates in the active profile. Users can save this profile, remove specific template items or rename a template. All these commands are available via the Command bar at the top of the template tree in the right hand side of the form. The save command is useful when the user wants to create a new template based on the active profile with some changes but he does not want it be applied to the active profile.

To merge another profiles' templates with the active profile, the user needs to load the second profile by pressing the 'Load Profile' button on the top-left hand corner of the form. Doing this loads all templates of the selected profile into the left hand tree view. Users can drag templates from the left hand side tree into the right hand side one. The merge tool automatically detects which node the dragged item should be placed in and highlights that node.


Merge Profiles
Load Profile
Active Profile
Estimated Total Weight
Cancel
Ok
For help on each control, press the Help (?) button on the top right hand side and click on the control.

Dragging 'Estimated Total Weight' template from loaded profile into 'Active Profile'

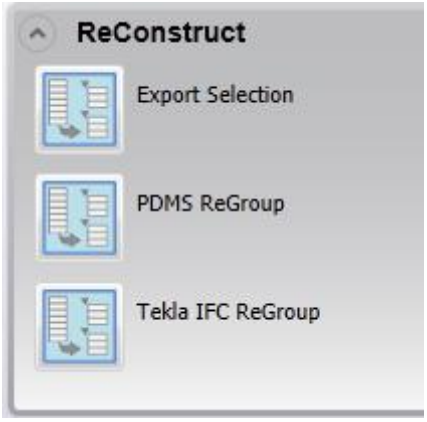
To remove a template from the list of available templates, the user needs to select that item and press the delete () button from the command bar or the 'Delete' key. Users are also able to rename an item by pressing the 'F2' key or by pressing rename () button on command bar.

Pressing the 'Ok' button applies the new designed template structure into the active profile and closes the merge tool. However if the user only wants to save this structure as a new profile, they should press the save button () from the command bar.

Notes:

- iConstruct 2015 merge tool only supports profiles generated by 2013 and 2014 versions of iConstruct.
- To upgrade a profile from previous versions of iConstruct the user needs to load that profile into iConstruct and save it into a new file.
- Upgrading profiles is only possible for plugins saved in iConstruct 2013.
- The merge tool only loads templates of the plugins that are being installed on the running iConstruct instance. If the loaded profile contains templates from a plugin which is not installed on the local machine, those templates cannot be merged.

26 ReConstruct



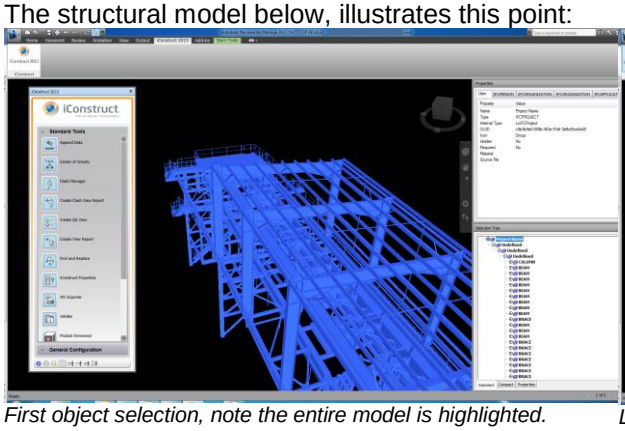
Examples of ReConstruct Templates

26.1 Concept

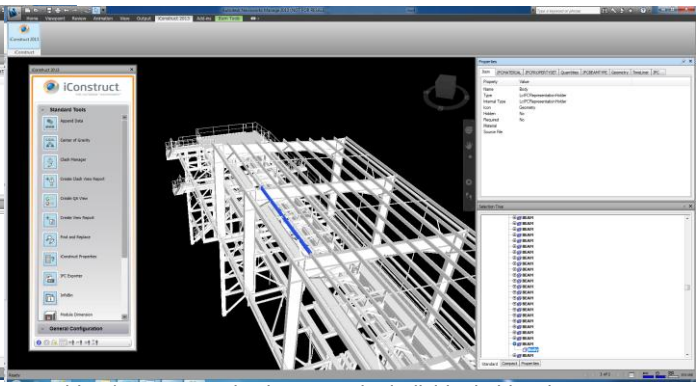
ReConstruct is a powerful new tool for iConstruct 2015 that addresses a problem many of our clients had when using native CAD files such as IFC and RVM (PDMS).

The main limitation of using IFC or PDMS files is that the ability to use the 'Selection Resolution' is limited to 'all or nothing'. Selecting an item in 'First Object' mode (which generally selects groups) will select the model or area in its entirety, whereas switching to last object or geometry selects items individually. This is not a problem unless the user wishes to make better use of the model data through iConstruct. Colourcoding or datalinking against 80,000 items for example would take far longer to process than it would if the model could be organised into a more efficient hierarchy based on a grouping level and only need to process say 8,000 groups.

The structural model below, illustrates this point:



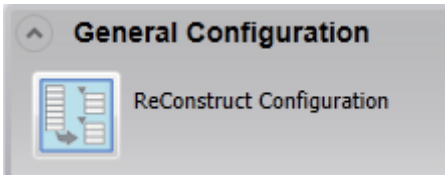
First object selection, note the entire model is highlighted.

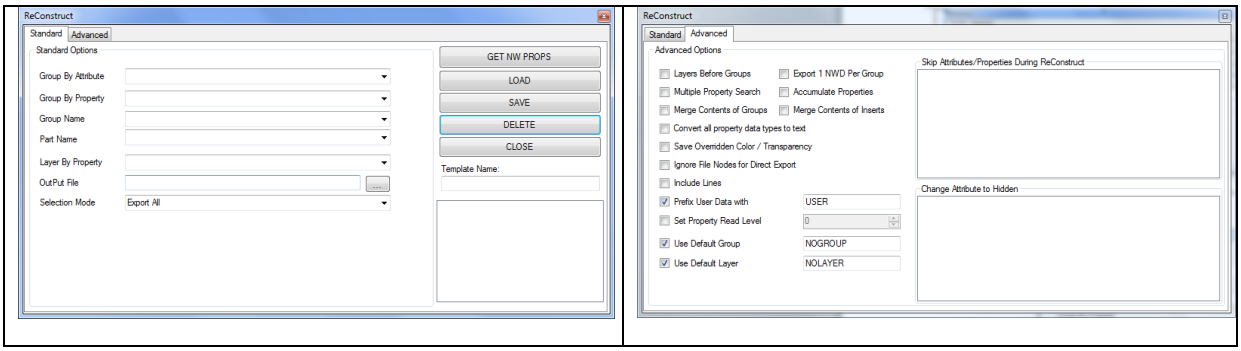


Last object/geometry selection, note the individual object is highlighted.

ReConstruct can also be used for work packing or exporting only selected items which is useful if part of a large model needs to be 'cropped' to load onto a tablet device.

26.2 ReConstruct Configuration





ReConstruct Configuration is split into 2 tabs – **Standard** and **Advanced**

Template Name contains the descriptive name of the template i.e. PDMS reconstruct, export Selection.

Standard Options are optional and only required if the model needs to be regrouped (if nothing is set, the model will be exported to a new file as-is).

Group By Attribute	The Attribute Tab to group by i.e. 'IFCPROPERTYSET'
Group By Property	The property to group by i.e. 'AssemblyGUID', 'Line Number' etc.
Group Name	The group display name to use (i.e. if the group by property is a GUID, the display name would likely be something more meaningful)
Part Name	The part display name to use (when left empty the original part name is used)
Layer By Property	The property name to use to layer the groups by
Output File	The output filename – either choose a static file name, or use %FILE% to use the current models name (suffixed with _ReConstruct). Leave blank to be prompted for a filename on export.
Selection Mode	Optionally export everything in the model, only visible items or only selected items.

Advanced Options

Layers Before Groups	By default all parts of the group will exist on the layer of the first object, to keep groups consistent. There are times when the user may want these groups split across layers, in this case tick this box. Be very careful using this as splitting a group may cause quantity errors based on group counts.
Export 1 NWD Per Group	Useful for batch-generating work packed models. Instead of regrouping the model, each group is exported as a separate nwd. This can be a bit slow – use BIMFlow for better control if using a large model
Multiple Property Search	Use to check for incremental property values, for example reconstructing an IFC with multiple assembly levels, AssemblyGUID, AssemblyGUID2 etc – ticking this scans for the last instance of the property to use. Useful for sub-assemblies in native CAD packages.
Accumulate Properties	As the properties are enumerated from the geometry level up, all the properties are appended together instead of just having the properties applied from the level that the grouping property is found at.
Merge Contents of Groups	If this is ticked then the geometry for the group is combined into one object and the first returned property set is applied to the new unioned object.
Merge Contents of Inserts	If this is ticked then the geometry for the insert is combined into one object and the first returned property set is applied to the new unioned object.
Convert All Property Data to Text	On occasion a property may have its data type changed part way through a model (i.e. a number changes to text). This can cause issues when reporting and using other functions. This can be enabled to force all data to text format as a workaround.

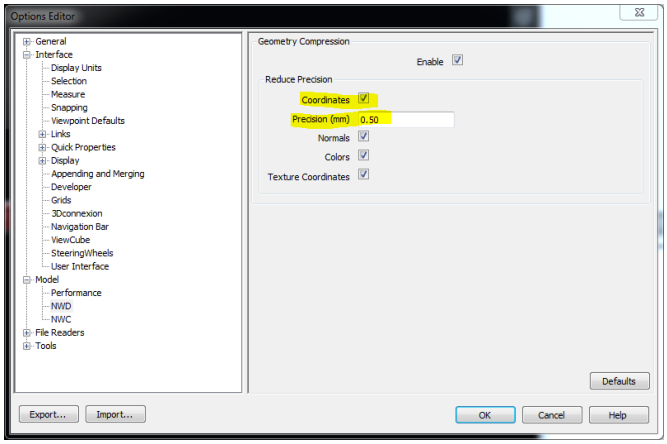
Save Overriden Color/Transparency	When writing the new NWD, use the overridden colors & transparency instead of the native colours. Useful if different projects have different standard colour requirements.
Ignore File nodes for direct export	When directly exporting a selection (i.e. without nominating a grouping level), this will avoid replicating the original file node as the top-level node in the new nwd hierarchy.
Include Lines	2D linework will be included in the exported nwd
Prefix User Data	ReConstruct cannot yet recreate user-data tabs, so it is recommended the existing user data is renamed so that Integrator can be run post-ReConstruct to rebuild the writeable tab
Manually Choose Property Read Level	For example if the user wants to reorganize the model based on the item name, but the item name they want to use is at the group level instead of the geometry level, this will force the requested level to be read, ignoring any others.
Use Default Group	Nominated default group name for items without a group. If this is not ticked, ungrouped items will be 'loose' in the model
Use Default Layer	Nominated default layer name for items without a layer. If this is not ticked, unlayered groups and items will be 'loose' in the model
Skip Attributes / Properties	When ticked, these properties or tabs will not appear in the exported model
Change Attribute to Hidden	Hides the nominated attribute, good for models with many data tabs that are handy to keep but not essential. Tabs can be made visible using the Navisworks Option Interface->Developer->Show Internal Properties

26.3 ReConstruct Known Issues / Workarounds

ReConstruct currently only exports / regroups geometry – lines or points are not exported. This will be included in a future release.

Currently the exported models are larger in MB than the source models (sometimes twice the size). This is something that we will endeavour to improve on in the next point release.

A workaround for the time being is to set the geometry precision to 0.5mm (or equivalent) and resave the NWD. The size will then be comparable. Note this will apply to ALL saved nwds from that point on unless switched off again.



27 Smart IFC Exporter

27.1 Introducing the IFC Export Module

The iConstruct Model IFC Export module is a plugin that has recently been introduced to iConstruct. Model IFC Export allows the user to export model geometry, item properties and material colours to the widely supported Industry Foundation Classes (IFC) format. This provides the user with the ability to import Navisworks BIM data into other construction software packages with ease.

iConstruct's IFC export capability is useful where updates need to be made to particular components of a Navisworks BIM model, or where there is a need to analyse the data stored in a Navisworks model using other construction software packages, for example, Clash Checking data with Tekla™.

What are the benefits of Exporting a model as an IFC file?

The Industry Foundation Classes (IFC) data model is an Open Standard, allowing CAD and BIM providers to conform to an accepted BIM format, as set by the construction industry. Since the IFC format is an Open Standard, it is supported by many industry leading CAD and BIM software packages. This allows BIM data to be exported from Navisworks and imported into other construction software packages, ultimately increasing the possibilities on what can be done with the models.

27.2 Features

The following table summarises the primary features of iConstruct's Model IFC Export module:

Primary Features	Details
✓ IFC export capability.	iConstruct's Model IFC Export outputs Navisworks models in the IFC 2x3 format.
✓ Export selection.	The IFC Exporter exports the selected items within a model allowing the user to control which parts of the model are exported to IFC.
✓ Export 3D Geometry.	Each selected item's 3D geometry is exported to IFC format as a Boundary Representation (BREP).
✓ Export Item Properties.	The categories, properties and each of the property values are stored for each of the selected items in the destination IFC file.
✓ Export Material Colours.	The material colour (RGB) values of the items are also stored in the outputted IFC file.
✓ Customisable Export Grouping.	Model items can be outputted at either selection level, or the IFC Exporter can break down each of the selected items into the lowest child items possible. When exporting relatively large models, it will be better to set the export grouping at selection level, which will limit the number of resulting building elements in the outputted IFC file. This flexibility allows the user to have control over the grouping method used when outputting models to IFC format, ultimately providing support for exporting relatively large models.
✓ Consistent Measurement Units.	The world length units of the original Navisworks

	model are used in the outputted IFC file for consistency in measurements when importing into other CAD/BIM software packages.
✓ Assign General Document Settings for Document Control.	The project name and owner details (organisation's name, and the owner's name) can be assigned to the outputted IFC for future reference and document control purposes.

27.3 Using iConstruct Model IFC Export

Select the Model Items to export

To begin the export process with the Model IFC Export module, the user must first select the model items that they wish to export to the IFC format. For example, in the model shown below in figure 1.1, a user has selected the top middle section of the building model, and it is this section that will be exported to IFC format (highlighted in blue).

To select multiple items in the Navisworks window, hold down the *ctrl* button on the keyboard while left mouse clicking each item that is to be included in the IFC export. The model items that have been selected are highlighted blue in the main Navisworks window.

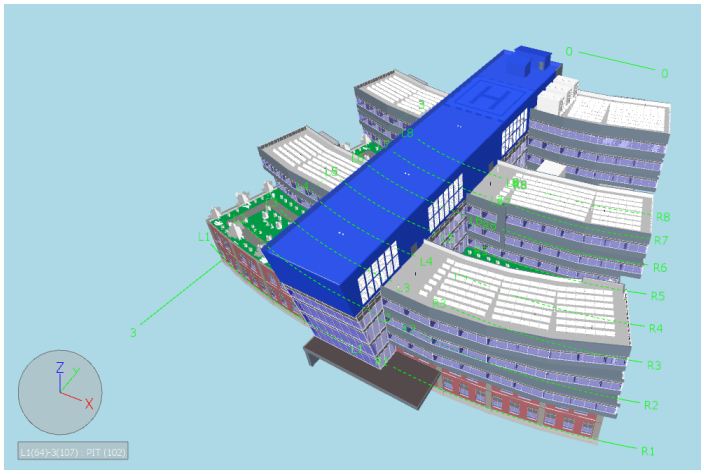


Figure 1.1: Selecting Model Items for the IFC Export (Highlighted as Blue)

Alternatively to export the entire model, right mouse click on an empty space in the main Navisworks window, move the mouse to "Select" in the menu, and click on the "Select All" option to select the entire model, as shown in Figure 1.2.

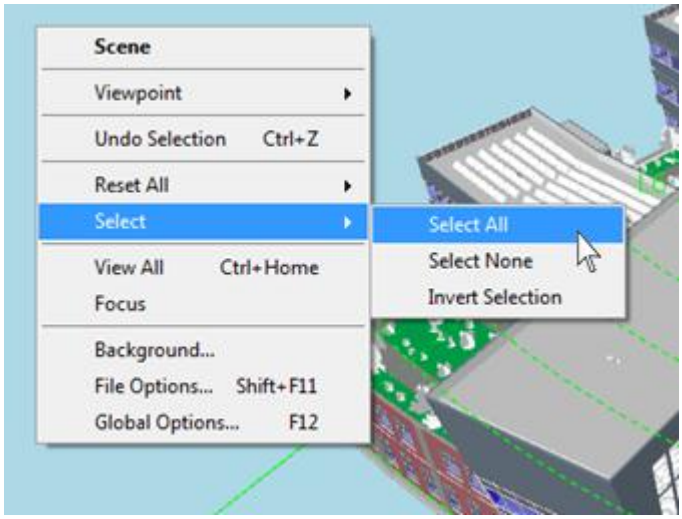


Figure 1.2: Selecting all Model Items

Open the Model IFC Export module

After selecting the items to be exported, open the iConstruct 2015 Toolbar and select the Model IFC Export tool in the Standard Tools menu, as shown in Figure 1.5. Left mouse click on the “IFC” icon to open the Model IFC Export module.

Figure 1.5: Select Model IFC Export from the iConstruct Standard Tools

Select the output file path, document settings and item handling behaviour.

iConstruct’s Model IFC Export module outputs an IFC File to a chosen location by providing a “Save As” dialog box. To open the “Save As” dialog box, and choose the destination of the output IFC file, simply click the “Save As” button on the IFC Exporter’s main window, as shown in label two in Figure 2.6.

Please note that the user cannot start an IFC Export without first selecting the destination of the output IFC file. After selecting the destination of the output IFC file, the “Save As” dialog box will close, and the textbox labelled “Output IFC File” will be updated to display the destination of the

output IFC File, as indicated in Figure 2.6. The “Start Export” button will become enabled once an output file destination has been chosen.

The IFC Exporter also provides the option of assigning a project name and owner to the outputted IFC File that can be used for document control and future reference.

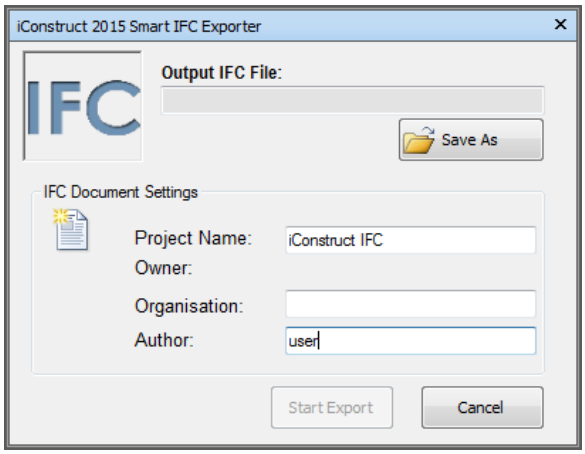


Figure 2.6: Main Window of IFC Exporter

Starting the Export Process

After the destination file path, project name, owner details, and Item Handling behaviour have been input, click on the “Start Export” button (Figure 2.6) to begin the IFC Export process. At first a dialog (see Figure 2.7) will appear indicating that the IFC Exporter is initialising and it will display the number of items that are to be output to the destination IFC File. The number of items will continue to increase as the IFC Exporter builds a database in memory for the items that need to be exported. At any time during initialisation, the process can be aborted by hitting the “A” key on the keyboard, then click “Yes” to confirm.

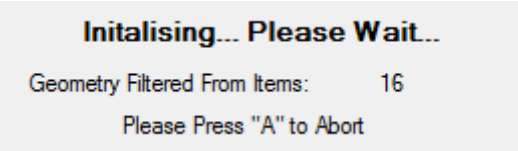


Figure 2.7: IFC Exporter, Initialising Screen

After the initialisation process, the IFC Exporter will then load the model geometry required for the IFC export into memory, while also displaying the progress. The user can click the “Cancel” button at any time to abort the IFC Export process.

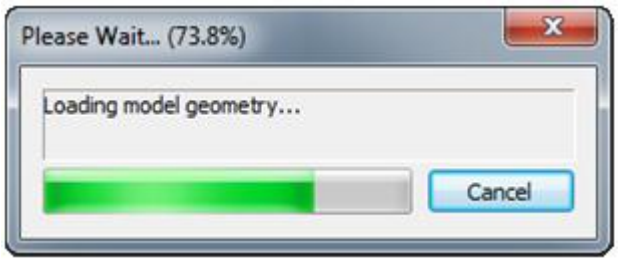


Figure 2.8: IFC Exporter, Loading Model Geometry

After loading the geometry into memory, the IFC Exporter will start building the 3D IFC Model. The progress is displayed while this is happening (as shown in Figure 2.9). Click the red button at the top right of the progress window to abort the process at any time.

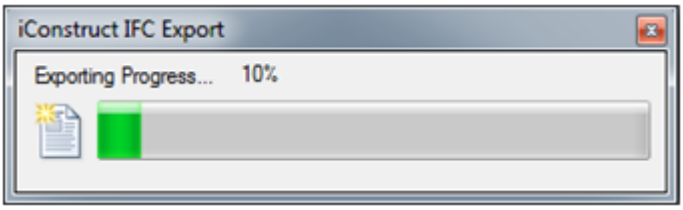


Figure 2.9: IFC Exporter, Progress

Receiving Confirmation that the IFC File has been created

After the IFC File has been successfully created, a message box verifying that the IFC model has been successfully created is displayed (as shown in Figure 2.10). The message box should also display the number of items (building elements) that were created in the IFC model, and the resulting IFC file size for reference.

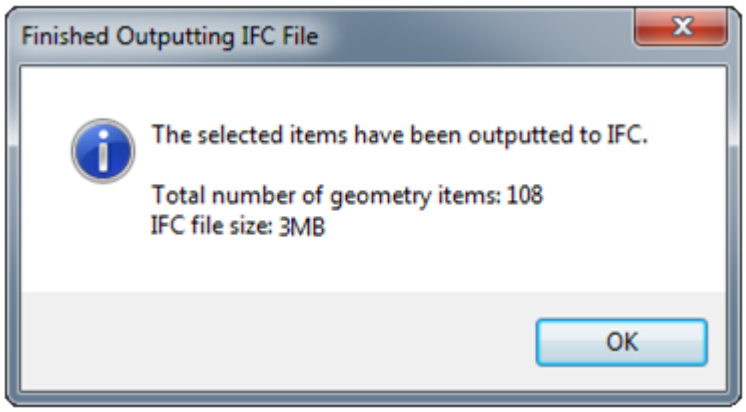

Finished Outputting IFC File
The selected items have been outputted to IFC.
Total number of geometry items: 108
IFC file size: 3MB
OK

Figure 2.10: IFC Exporter, Output Summary

Import the userr model into another construction software package

Now the newly created Open Standard IFC model file should be able to be open with other construction software packages, provided they support IFC. The previously selected Navisworks items (see Figure 2.1), including each item's 3D geometry, property categories, names and values, and also material colours, used with the iConstruct IFC Model Export should be visible within the external BIM/CAD program, as shown in Figure 2.11.

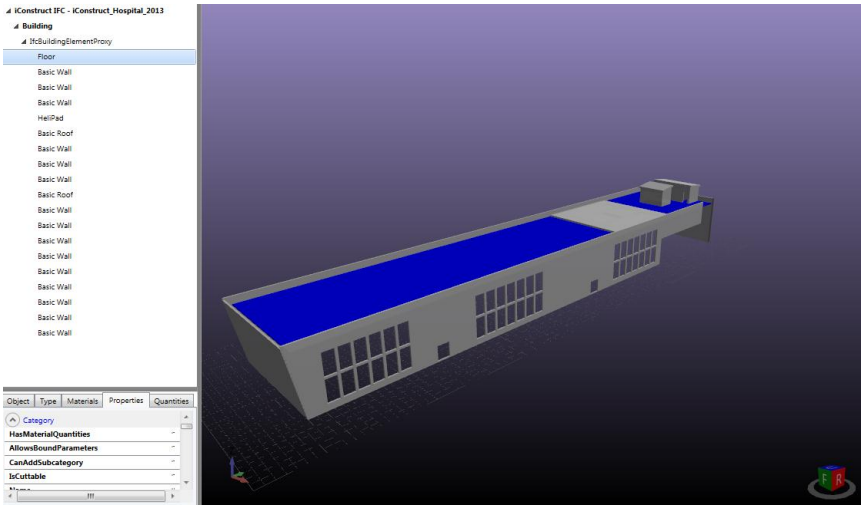


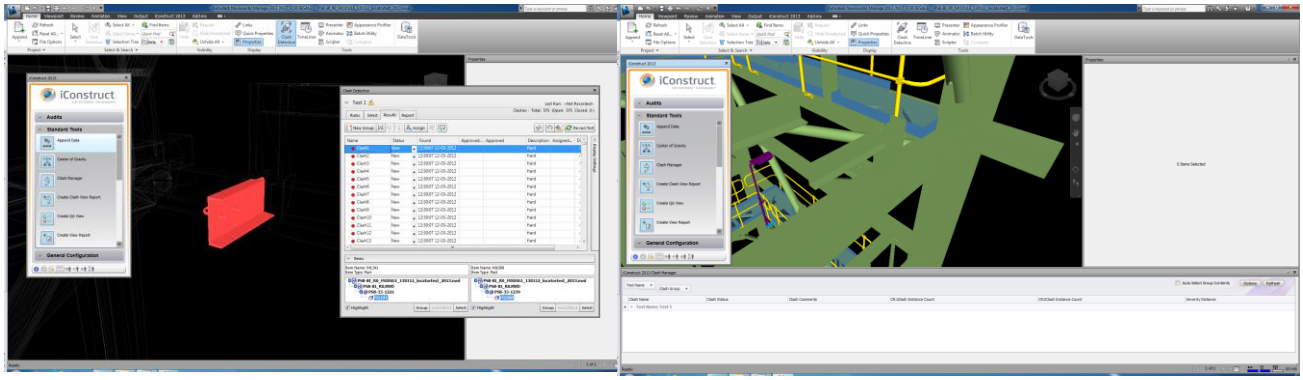
Figure 2.11: Opening the Exported IFC File with an External BIM Package

28 Clash Manager

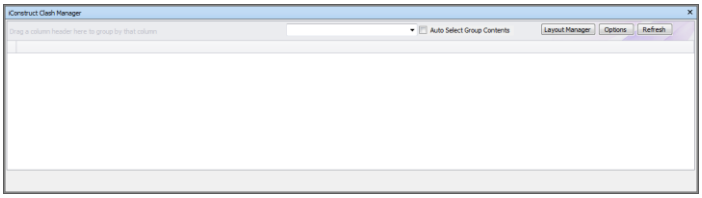
28.1 Overview

This routine is used to assist grouping, filtering and viewing clashes, and optionally sending the filtered results to the Export Clash View report command.

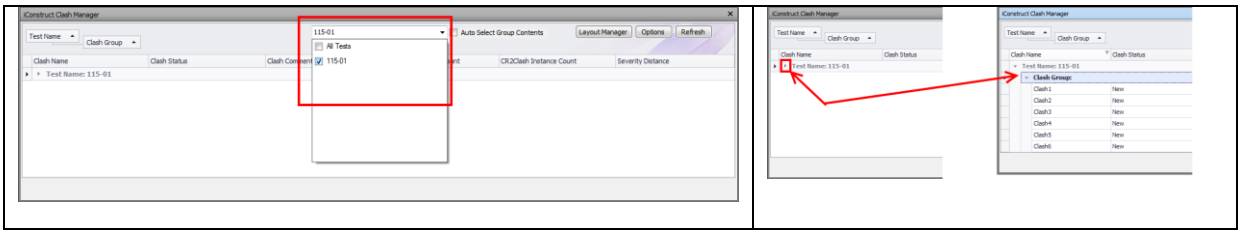
Once the clash test(s) have been run, close the ‘Clash Detective’ window, and open the ‘Clash Manager’ window from the ‘Standard Tools’ panel.



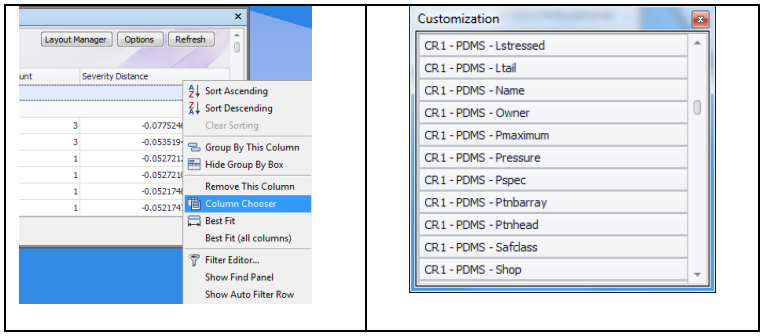
The Clash Manager panel will open. No test data has yet been loaded so the panel is empty.



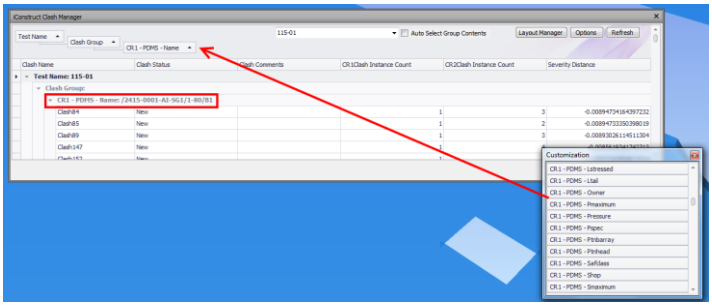
To load test data, use the drop-down checklist. The clash results are now loaded in the panel, to navigate use the triangular icon next to the grouping level name, to expand the selection.



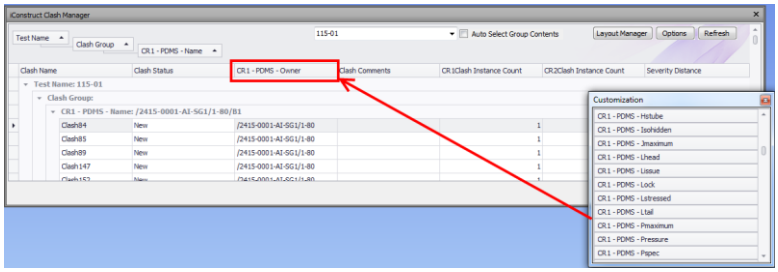
In the default state the Clash Detective grouping levels are preserved, to add a grouping level, right-click on the column headers and click ‘Column Chooser’. This will bring up the column chooser panel. In this panel properties prefixed with CR1 indicate the property is from clashing item 1, and in CR2 clashing item 2 respectively.



To add a grouping level, drag the required column from the column chooser panel into the grouping header. This will automatically add a new grouping level to the rows below.



Column data can also be added to the rows by dragging the column into the column header:

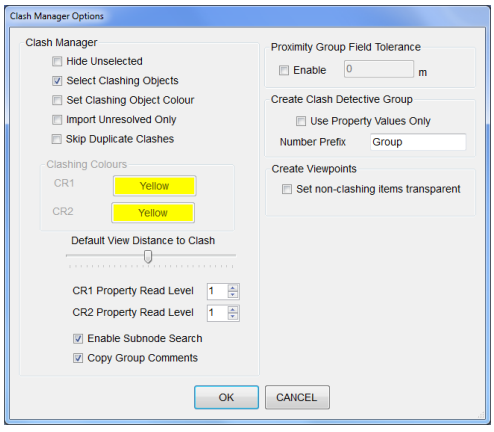


The configuration of the grouping levels and column headers can be saved & restored using the Layout Manager button.

Clashes can be viewed by clicking on the clash row.

28.2 Configuration

Clicking the ‘Options’ panel brings up the ‘Clash Manager Options’ form:



Clash Manager Options

Hide Unselected – anything not selected in the clash manager gets hidden.

Select Clashing Objects – clashing objects are selected in the model

Set Clashing object colour – sets complimentary colours for the 2 clashing items (turning off 'Select Clashing Objects' is recommended if this is selected).

Import Unresolved Only – only import unresolved clashes

Skip Duplicate Clashes – ignore clashes if the 2 items clashing have been reported in a previous clash.

Use Property Values Only – When creating a Clash Detective group (based on the Clash Manager grouping level) use the property value of the group name only, otherwise it will use the property name + value.

Number Prefix – when renumbering clash detective groups (using the context menu) use this prefix

Default View Distance to Clash – when the view is generated, places the camera closer or further away from the clash point.

Property Read Level – sets the hierarchy level for reading the clashing object information, the geometry level is 0 and each level above the geometry corresponds to this value.

Enable Subnode Search – If this option is selected, reads the node below the property read level as well & fills in any properties not filled in at the read level, plus any additional properties. This is useful for reading the unique ID of Revit Elements, for example.

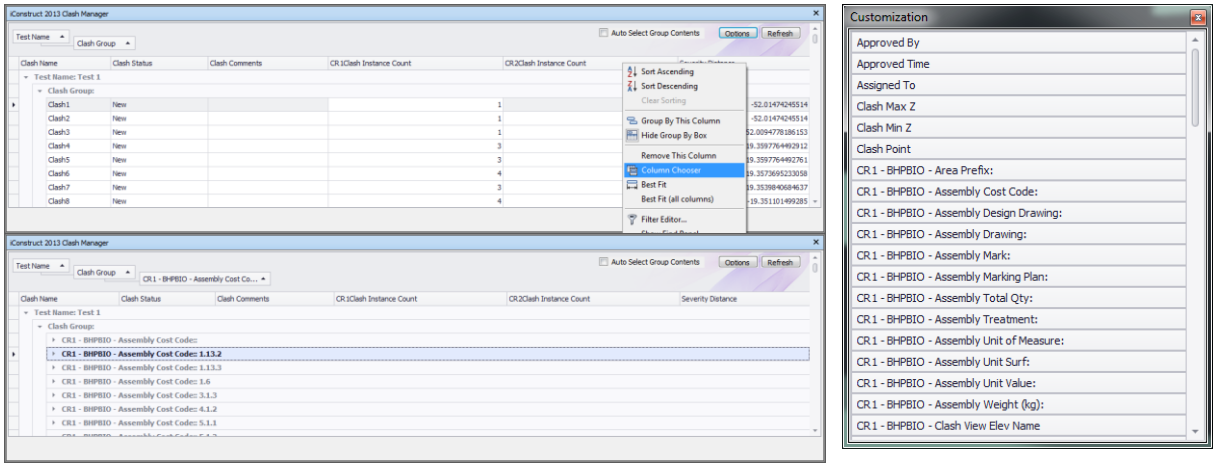
Copy Group Comments – when publishing groups back to Clash Detective, copy the original group comments if available

Set Non-Clashing Items Transparent – when creating a viewpoint, dim and make semi-transparent the other items to highlight the clashing objects

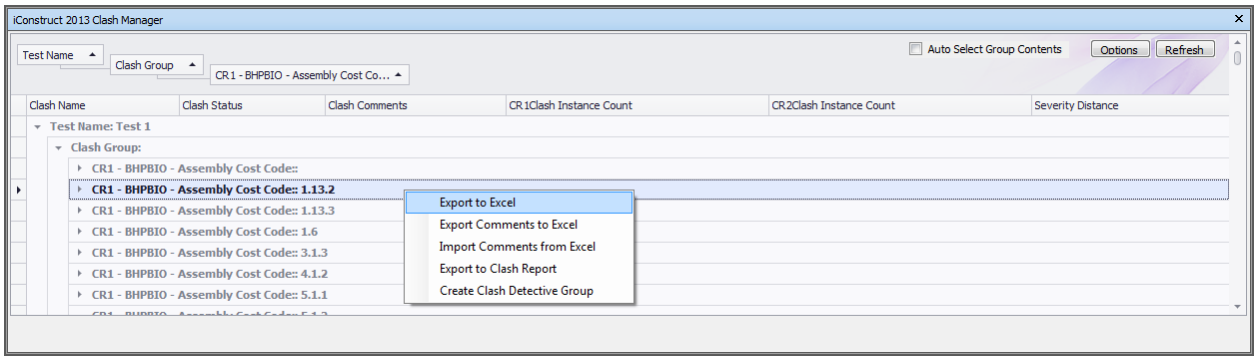
Proximity Group Field Tolerance – the tolerance to use to create a 'Proximity Group' column per clash, to be able to group clashes that are physically within proximity to each other.

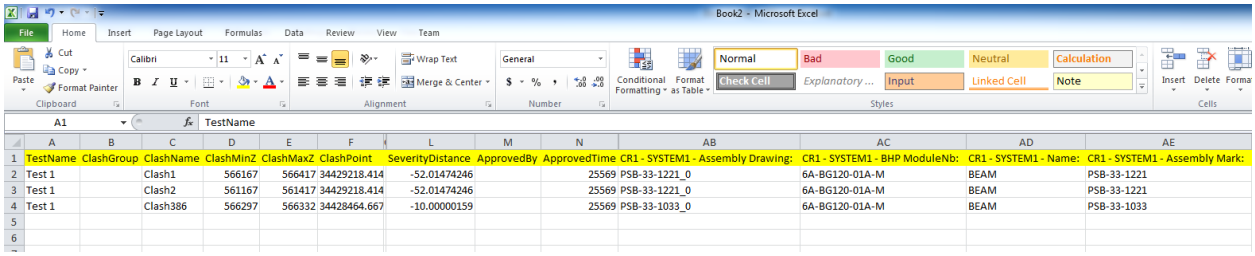
28.3 Usage

When the clash data is read, the properties of the clashing items are read in at the same time. To import a property into the table, right-click on a column header and click 'Column Chooser', then drag the column into the data grid to create the new grouping level, in this case the 'cost code' has been dragged in to create a new grouping level.

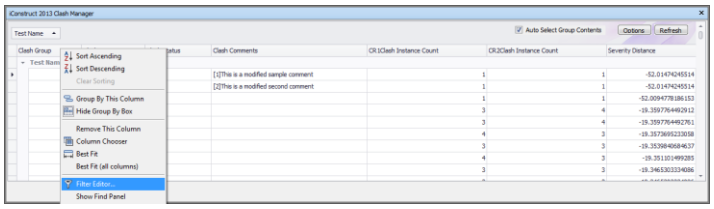

Customization
Approved By
Approved Time
Assigned To
Clash Max Z
Clash Min Z
Clash Point
CR 1 - BHPBIO - Area Prefix:
CR 1 - BHPBIO - Assembly Cost Code:
CR 1 - BHPBIO - Assembly Design Drawing:
CR 1 - BHPBIO - Assembly Drawing:
CR 1 - BHPBIO - Assembly Mark:
CR 1 - BHPBIO - Assembly Marking Plan:
CR 1 - BHPBIO - Assembly Total Qty:
CR 1 - BHPBIO - Assembly Treatment:
CR 1 - BHPBIO - Assembly Unit of Measure:
CR 1 - BHPBIO - Assembly Unit Surf:
CR 1 - BHPBIO - Assembly Unit Value:
CR 1 - BHPBIO - Assembly Weight (kg):
CR 1 - BHPBIO - Clash View Elev Name

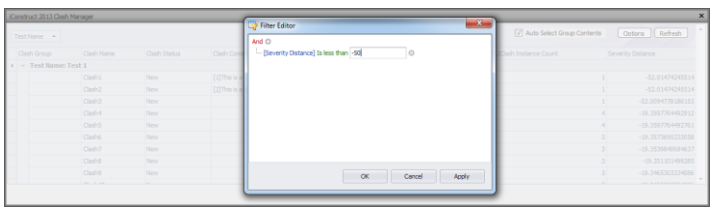
To export the clash data to an excel file quickly, click the 'Auto Select Group Contents' button then right-click on a group header. Click 'Export to Excel' and the excel window will appear.


iConstruct 2013 Clash Manager
Auto Select Group Contents
Options
Refresh
Clash Name
Clash Status
Clash Comments
CR 1Clash Instance Count
CR 2Clash Instance Count
Severity Distance
Test Name: Test 1
Clash Group:
CR1 - BHPBIO - Assembly Cost Code::
CR1 - BHPBIO - Assembly Cost Code:: 1.13.2
CR1 - BHPBIO - Assembly Cost Code:: 1.13.3
CR1 - BHPBIO - Assembly Cost Code:: 1.6
CR1 - BHPBIO - Assembly Cost Code:: 3.1.3
CR1 - BHPBIO - Assembly Cost Code:: 4.1.2
CR1 - BHPBIO - Assembly Cost Code:: 5.1.1
Export to Excel
Export Comments to Excel
Import Comments from Excel
Export to Clash Report
Create Clash Detective Group

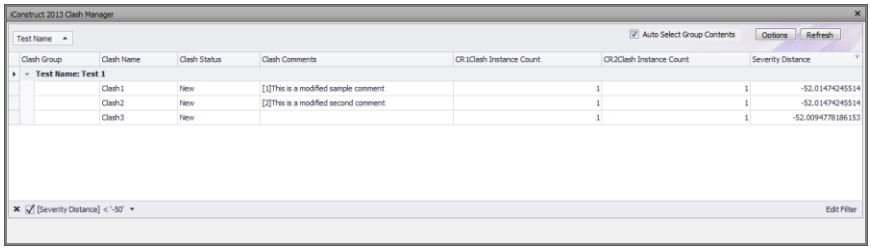

Book2 - Microsoft Excel
TestName
TestName ClashGroup ClashName ClashMinZ ClashMaxZ ClashPoint SeverityDistance ApprovedBy ApprovedTime CR1 - SYSTEM1 - Assembly Drawing: CR1 - SYSTEM1 - BHP ModuleNb: CR1 - SYSTEM1 - Name: CR1 - SYSTEM1 - Assembly Mark:
Test 1 Clash1 566167 566417 34429218.414 -52.01474246 25569 PSB-33-1221_0 6A-BG120-01A-M BEAM PSB-33-1221
Test 1 Clash2 561167 561417 34429218.414 -52.01474246 25569 PSB-33-1221_0 6A-BG120-01A-M BEAM PSB-33-1221
Test 1 Clash386 566297 566332 34428464.667 -10.00000159 25569 PSB-33-1033_0 6A-BG120-01A-M BEAM PSB-33-1033

To export to a clash report, do the same but click 'Export to Clash Report'. The views will be automatically selected.



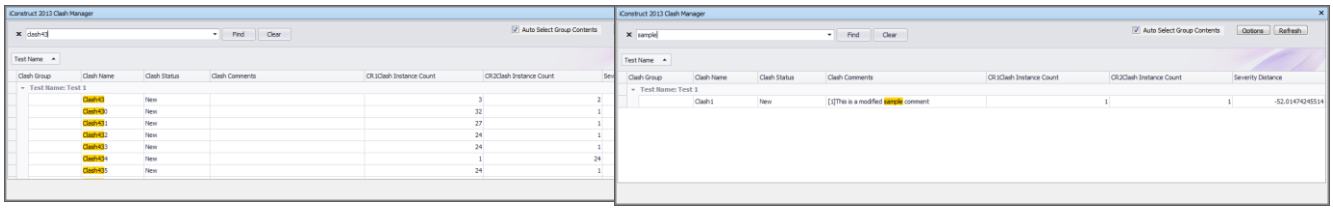


The data can also be filtered using the filter command. To filter the data, right click on a column header and click 'Filter Editor' to display the filter panel. Users can then build up a filter command before applying to filter the data. Note users can apply either text fields or filter by numeric values

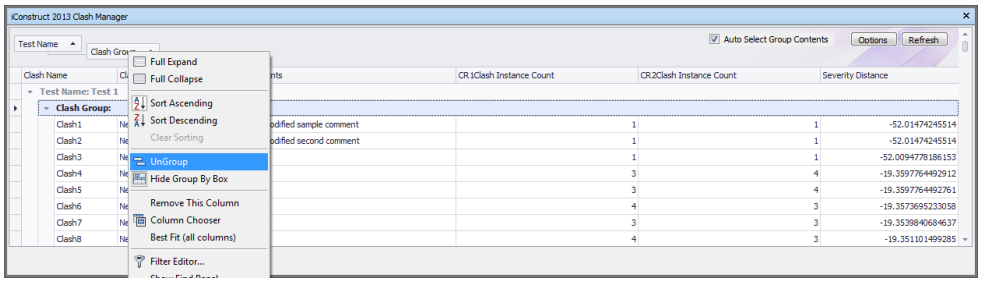


The filter can be cleared by either clicking the cross (delete) or unticking (make inactive) in the lower left panel.

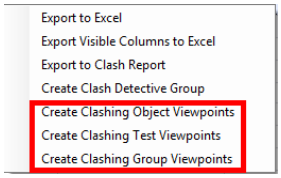
Additionally ‘Show Find Panel’ can be enabled for quickly searching on all values in the display



The grouping level in Clash Manager can be ‘pushed’ back to Clash Detective. It is recommended to clear all other group levels except for the one(s) deemed important. In this case the Test & Group grouping levels are removed and only cost code retained. To ungroup right-click the group box and click ‘UnGroup’

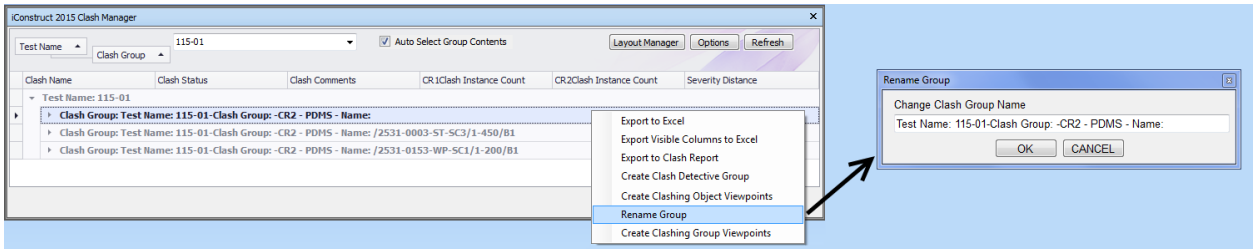


New for 2015 is the ability to automatically create viewpoints for the Clash Test, Group or Items.

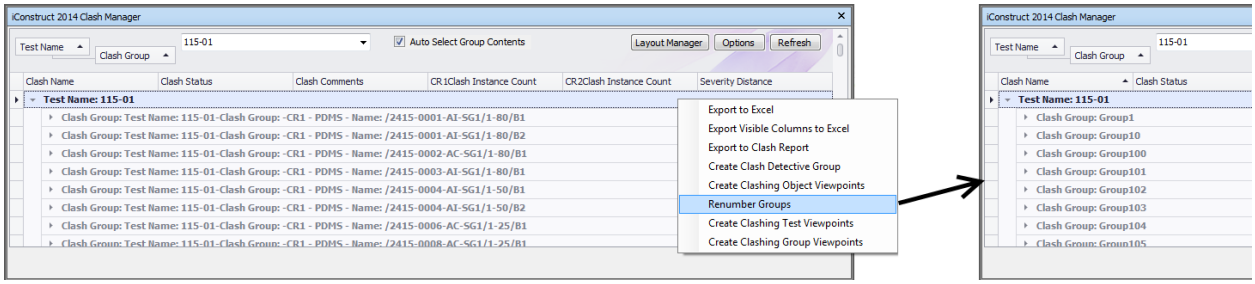

Export to Excel
Export Visible Columns to Excel
Export to Clash Report
Create Clash Detective Group
Create Clashing Object Viewpoints
Create Clashing Test Viewpoints
Create Clashing Group Viewpoints

To create the viewpoints, right click on a test, group or clash row and click the relevant option. The visibility settings in Options (colour, hide unselected etc.) will be applied when generating the viewpoints.

Also new is the ability to manually rename groups from within Clash Manager (note these groups must have been published to Clash Detective first – it will update the group name in both Clash Manager and Clash Detective.



Groups can also be renumbered automatically by selecting the test name and right-clicking on ‘Renumber Groups’ (note these groups must have been published to Clash Detective first).


iConstruct 2014 Clash Manager
Test Name
Clash Group
115-01
Auto Select Group Contents
Layout Manager
Options
Refresh
Clash Name
Clash Status
Clash Comments
CR1Clash Instance Count
CR2Clash Instance Count
Severity Distance
Test Name: 115-01
Clash Group: Test Name: 115-01-Clash Group: -CR1 - PDMS - Name: /2415-0001-AI-SG1/1-80/B1
Clash Group: Test Name: 115-01-Clash Group: -CR1 - PDMS - Name: /2415-0001-AI-SG1/1-80/B2
Clash Group: Test Name: 115-01-Clash Group: -CR1 - PDMS - Name: /2415-0002-AC-SG1/1-80/B1
Clash Group: Test Name: 115-01-Clash Group: -CR1 - PDMS - Name: /2415-0003-AI-SG1/1-80/B1
Clash Group: Test Name: 115-01-Clash Group: -CR1 - PDMS - Name: /2415-0004-AI-SG1/1-50/B1
Clash Group: Test Name: 115-01-Clash Group: -CR1 - PDMS - Name: /2415-0004-AI-SG1/1-50/B2
Clash Group: Test Name: 115-01-Clash Group: -CR1 - PDMS - Name: /2415-0006-AC-SG1/1-25/B1
Export to Excel
Export Visible Columns to Excel
Export to Clash Report
Create Clash Detective Group
Create Clashing Object Viewpoints
Renumber Groups
Create Clashing Test Viewpoints
Create Clashing Group Viewpoints
iConstruct 2014 Clash Manager
Test Name
Clash Group
115-01
Clash Name
Clash Status
Test Name: 115-01
Clash Group: Group1
Clash Group: Group10
Clash Group: Group100
Clash Group: Group101
Clash Group: Group102
Clash Group: Group103
Clash Group: Group104

29 iConstruct Server

29.1 Overview

iConstruct server/client is a powerful workflow-based designer for automating many of iConstruct's and some of Navisworks features. iConstruct 2015 introduces the first iteration of this module and the team at iConstruct will be expanding on it as we receive more user feedback.

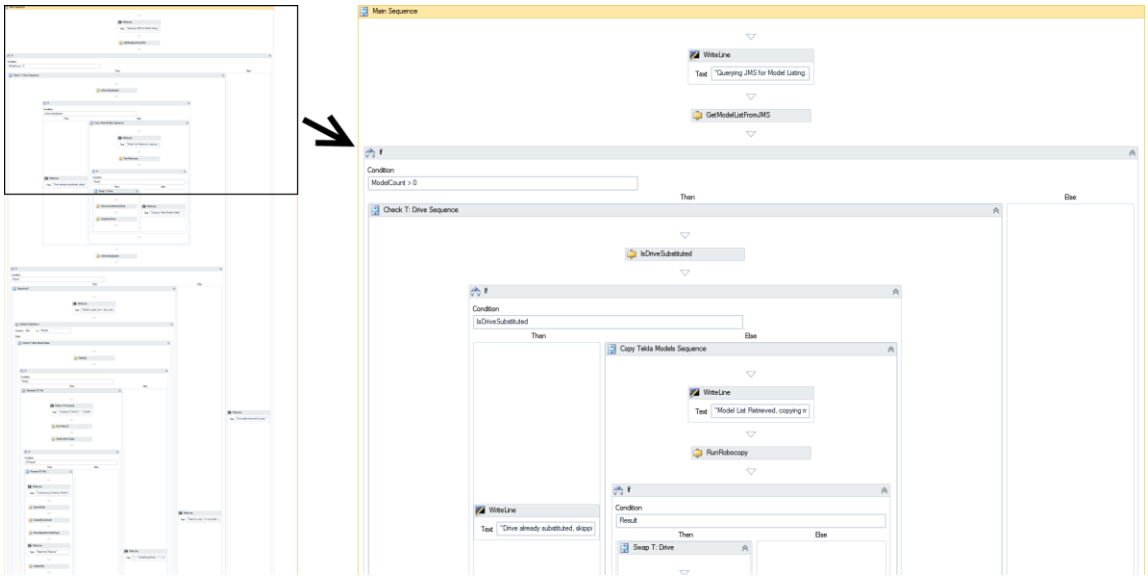
The main reason for the development of iConstruct server is for batch processing of models from various CAD packages such as RVM, IFC, RVT, DWG and produce a unified BIM output both in terms of data and model structure, for use as a federated model.

iConstruct server can be used to process hundreds of models overnight to a specification, so each morning all models are processed to the unified format and available for reporting or interface checking.

Note that iConstruct server is highly technical to use and is intended for use by users who have a programming or scripting background and a thorough understanding of both Navisworks and iConstruct.

Some of the features of iConstruct server:

- Retrieve a listing of model names from Excel/SQL
- Batch process models using Integrator, Datalink, Colourcode and ReConstruct
- Update viewpoints in a model
- Perform case-based logic on workflows (if model name indicates a certain discipline, run a different datalinker)
- Export workflows as a macro, and add to the iConstruct panel as a one-click button
- Perform file operations such as network drive mapping, copying or deleting files & folders
- Export data from Navisworks models to Microsoft Access Accdb file



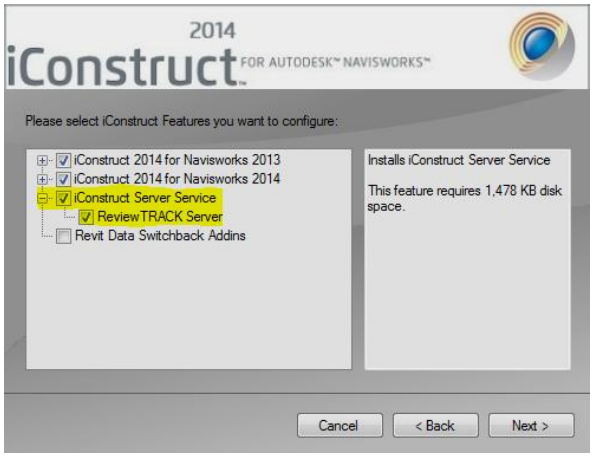
Example of a workflow

29.2 Installation

To install iConstruct server the pre-requisite is to have Microsoft SQL Server available (any version, including Express). For information on downloading and installing Microsoft SQL Server Express please visit http://www.microsoft.com/express/sql/

Note that iConstruct server is also used for ReviewTRACK, so the user can install the ReviewTRACK Server at the same time if desired.

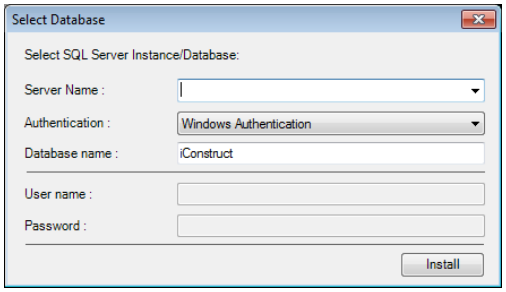
During initial installation, or by rerunning installation and selecting 'Modify', select 'iConstruct Server Service'. This will automatically select ReviewTRACK Server as well. Click Next. The following page asks for the name or IP address of an existing iConstruct Server – since we are installing the server this can be left blank, click Next, then 'Finish' to start the installation.

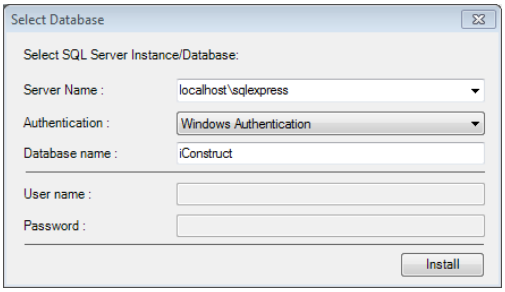

2014
iConstruct FOR AUTODESK NAVISWORKS
Please select iConstruct Features you want to configure:
iConstruct 2014 for Navisworks 2013
iConstruct 2014 for Navisworks 2014
iConstruct Server Service
ReviewTRACK Server
Revit Data Switchback Addins
Installs iConstruct Server Service
This feature requires 1,478 KB disk space.
Cancel
< Back
Next >

2014
iConstruct FOR AUTODESK NAVISWORKS
Please specify the name or IP address of the iConstruct 2014 Server :
Note: If you do not have iConstruct 2014 Server setup in your network, or the server is not yet installed, you can ignore this page by pressing Next.
Server Name or IP Address:
Please use Windows Update to check for any critical updates to the .NET Framework.
Cancel
< Back
Next >

During the installation the user will be prompted for the location and login credentials of the SQL Server to use. Use the drop-down list of servers to select a server, or if the list is empty type the name and instance. In this case we are using the SQL Server Express installed on the local PC so will use the localhost address with the instance name 'SQLEXPRESS'. We will also use the default database name 'iConstruct', but a different name can be nominated if desired or if more than one database is required.

In most cases the authentication type will be left as windows authentication, but if the users' database administrator requires a certain login to be used, the authentication can be switched to SQL Server Authentication, which provides the option to type in the username and password.



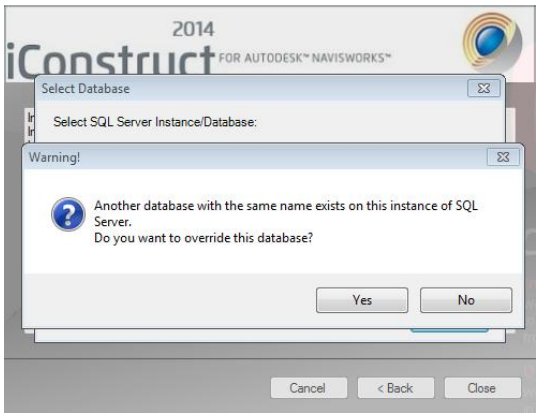


Once the details are filled in, click 'Install'

Note: If the server has already been installed to the SQL server, a warning message will appear letting the user know there is an existing database to avoid potential loss of data. Clicking yes will completely delete the existing data and create a new database, clicking no will cancel the installation. The installation can then be rerun with a different database name.

A confirmation message will appear at the end of installation. Click 'Close'

iConstruct Server is now installed on the computer, and other users can type the address of the pc into the required server connection dialog (see later).



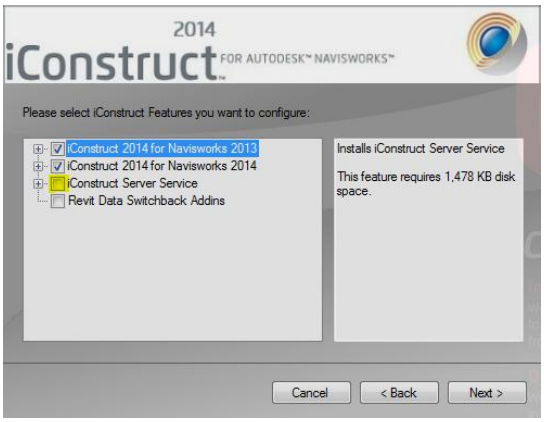
2014
iConstruct FOR AUTODESK NAVISWORKS
iConstruct 2014 for Navisworks 2013/2014 has been successfully installed.
Click "Close" to exit.
Please use Windows Update to check for any critical updates to the .NET Framework.
Cancel
< Back
Close

29.3 UnInstallation

To uninstall, run the setup program and select either ‘Modify’ to just uninstall iConstruct server, or ‘Remove’ to uninstall all versions of iConstruct & servers from the computer. In this case we are only going to uninstall the server so leave on ‘Modify’ and click ‘Next’.

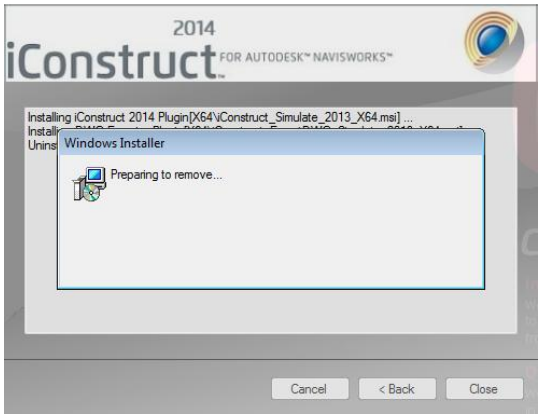
Untick the feature(s) to uninstall, and click ‘Next’.

2014
iConstruct FOR AUTODESK NAVISWORKS
Welcome to the iConstruct 2014 Setup program. This installer will guide you through the steps required to modify the current installed iConstruct 2014 for Autodesk Navisworks on your computer.
Modify
Select new program features to add or select currently installed features to remove.
Repair
Reinstall all program features installed by the previous setup.
Remove
Remove all installed features.
Cancel
< Back
Next >


2014
iConstruct FOR AUTODESK NAVISWORKS
Please select iConstruct Features you want to configure:
iConstruct 2014 for Navisworks 2013
iConstruct 2014 for Navisworks 2014
iConstruct Server Service
Revit Data Switchback Addins
Installs iConstruct Server Service
This feature requires 1,478 KB disk space.
Cancel
< Back
Next >

Click ‘Next’ to the following page, then ‘Finish’ to perform the uninstallation

2014
iConstruct FOR AUTODESK NAVISWORKS
Please specify the name or IP address of the iConstruct 2014 Server :
Note: If you do not have iConstruct 2014 Server setup in your network, or the server is not yet installed, you can ignore this page by pressing Next.
Server Name or IP Address:
Please use Windows Update to check for any critical updates to the .NET Framework.
Cancel
< Back
Next >


2014
iConstruct FOR AUTODESK™ NAVISWORKS™
Installing iConstruct 2014 Plugin[X64\iConstruct_Simulate_2013_X64.msi] ...
Windows Installer
Preparing to remove...
Cancel
< Back
Close

2014
iConstruct FOR AUTODESK™ NAVISWORKS™
iConstruct 2014 for Navisworks 2013/2014 has been successfully installed.
Click "Close" to exit.
Please use Windows Update to check for any critical updates to the .NET Framework.
Cancel
< Back
Close

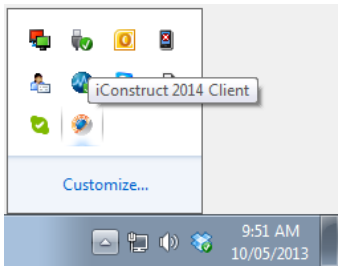
30 iConstruct Client

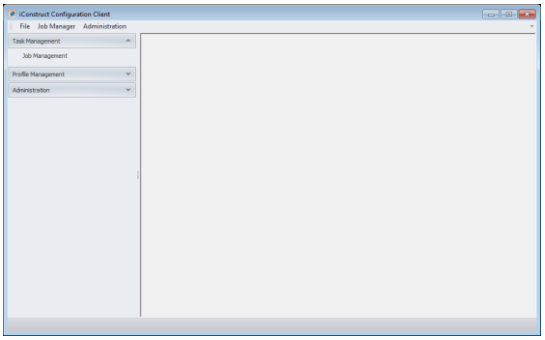
30.1 Overview

iConstruct client is the workflow-designer side of iConstruct Server. The client is used to design the workflows, which are then available to all users by connecting to the server. The iConstruct client can be used in standalone mode if a server is not available.

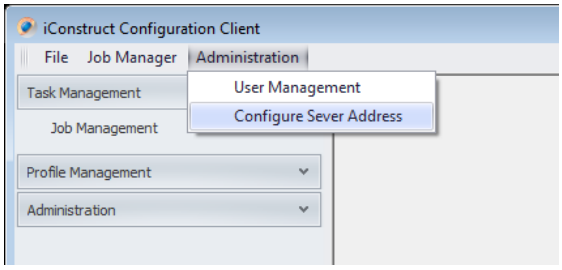
30.2 Configuration

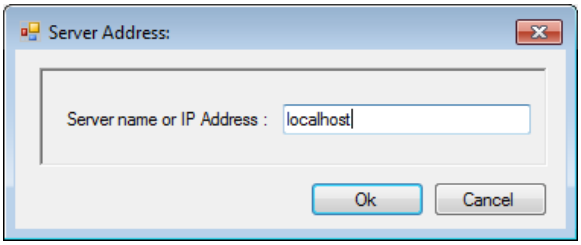
To open the client, click on the 'hidden icons' panel on the Windows toolbar, double-click on the iConstruct Client icon and the 'iConstruct Configuration Client' window will appear in its default state.





First we need to tell the client where the iConstruct server is located, on the 'Administration' menu, click 'Configure Server Address'. In the 'Server Name or IP Address' type the details of the server. In this case we are working on the computer hosting the server so will use the server name 'localhost'

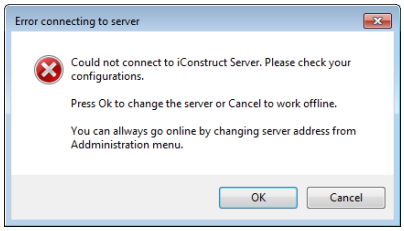




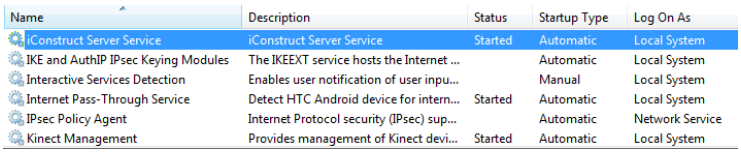
Click 'Ok' to connect.

If the server could not be found, a message will notify the user to click 'Ok' to try another server address, or click 'Cancel' to work in offline mode – note that offline workflows will only be available on the local PC. If the user creates a workflow in offline mode they will need to save as a file and import when reconnected to the server.

If this message appears unexpectedly, check that there is network connectivity to the iConstruct server and that the iConstruct Server Service is running on the server PC.


Error connecting to server
Could not connect to iConstruct Server. Please check your configurations.
Press Ok to change the server or Cancel to work offline.
You can allways go online by changing server address from Addministration menu.
OK
Cancel

Message displayed if server is not available

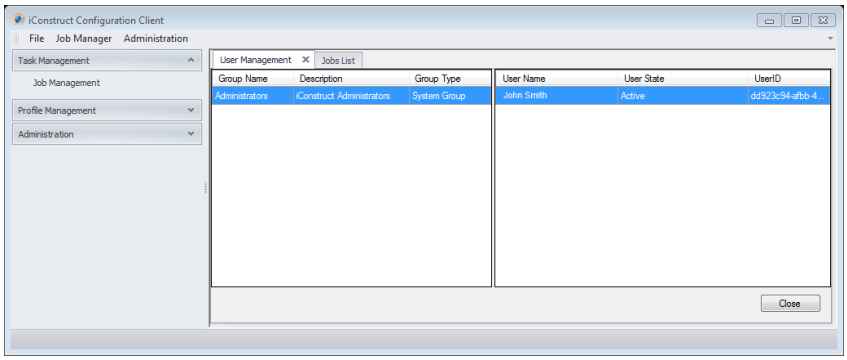


The iConstruct Server Service listed in Control Panel->Administrative Tools->Services

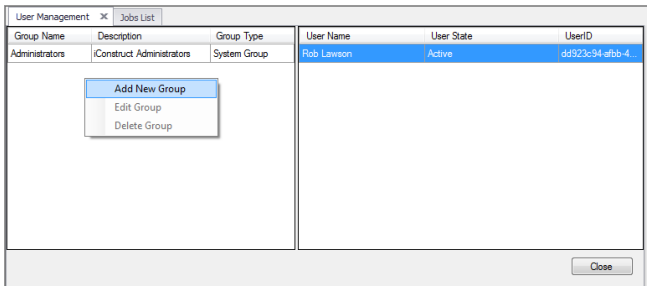
30.3 User Configuration

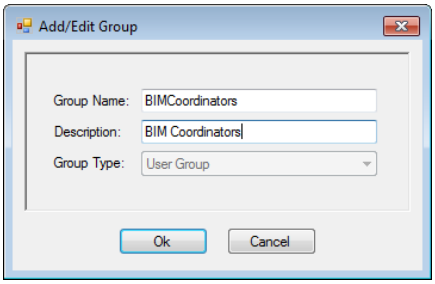
By default the account used to install the server is given administrative permissions, if the user connecting is new, they will need to be given permissions by the administrative account.

Click on ‘Task Management’ then ‘Job Management’ to bring up the Jobs List page, then switch to the ‘User Management’ tab. In the left pane are the available groups, in the right pane are the users assigned to the selected group.

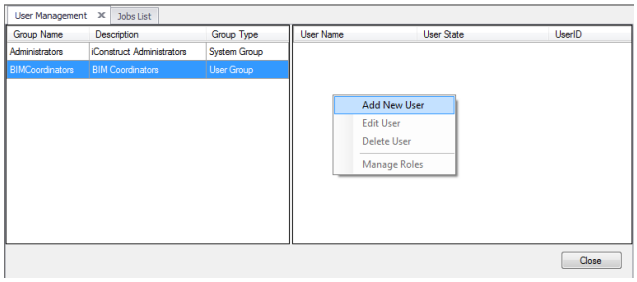


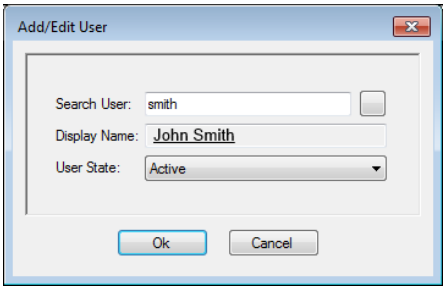
To create a group, right click in the left panel and click ‘Add New Group’. To delete or edit an existing group, right click on the group name and choose accordingly.



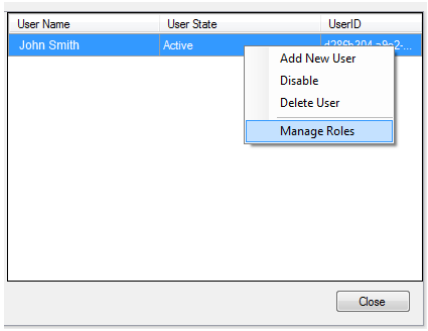


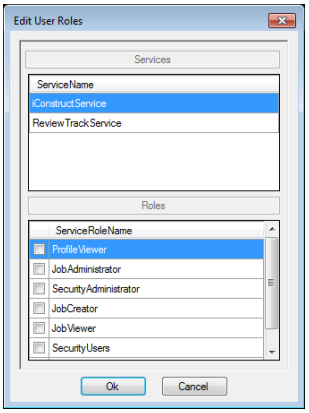
To add a user to a group, select the group name in the left pane and right click to ‘Add New User’ in the right pane. The add/edit user dialog will appear, type the Windows login name of the user in ‘Search User’ and click the button to the right to search for the users name on the network. If the login name is valid the display name will appear, click ok.





Once the user has been added, we need to assign them permissions. Right click on the user and select ‘Manage Roles’. In this case we are assigning roles for the iConstruct Service so we will leave this highlighted.





The different roles available are:

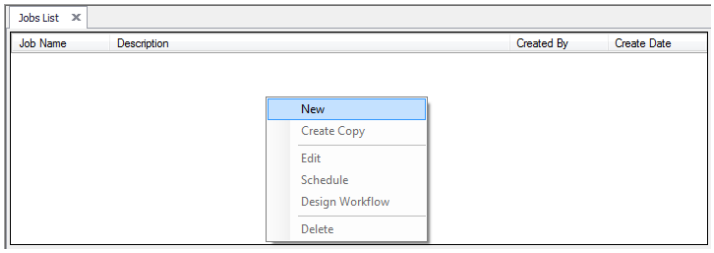
Role	Description
JobAdministrator	Create, edit or delete any job in the jobs list
JobCreator	Create a new job in the jobs list
JobViewer	View any job in the jobs list
SecurityAdministrator	Assign permissions to any user
SecurityUsers	See permissions assigned to users
ProfileAdministrator	Add, edit or remove iConstruct templates in the Profile Management section
ProfileViewer	View iConstruct templates in the Profile Management section

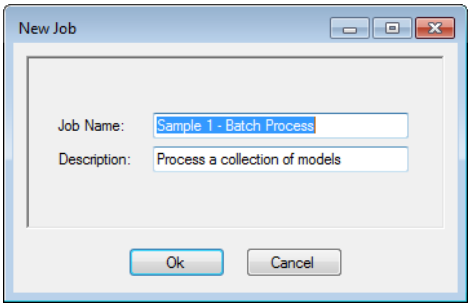
Once the roles have been assigned for the user they will have these rights when next connecting to the server.

30.4 Job Configuration

To create a new job, right-click in the ‘Jobs List’ panel and select ‘New’

The ‘New Job’ dialog will appear, enter a Job Name and a description.





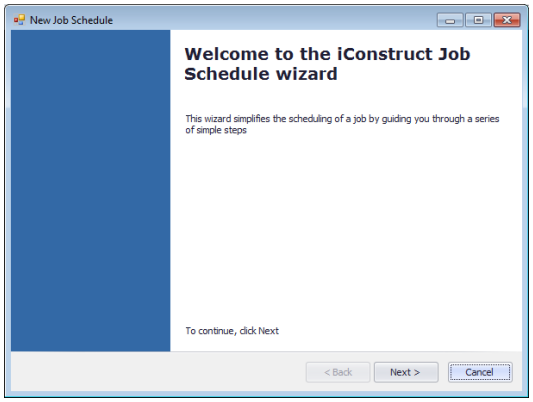
The following commands are available on the context menu:

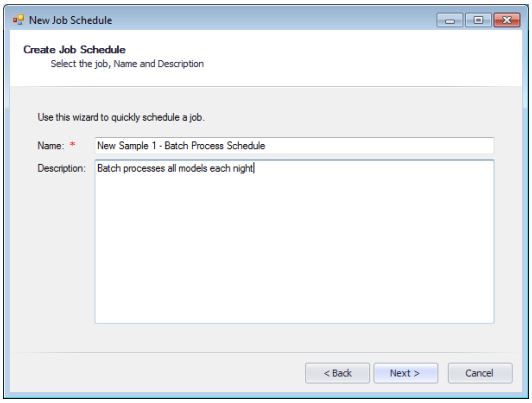
Command	Description
New	Create a new job
Create Copy	Creates a copy of the selected job, initially as 'Copy of (job name)'
Edit	Edits the name or description of the selected job
Schedule	Schedules the job to run at a certain time on nominated day(s)
Design Workflow	Opens the job in the workflow designer
Delete	Deletes the selected job

30.5 Schedule Configuration

To schedule a job, right click on the job that is to be scheduled and click 'Schedule' this will start the Schedule Wizard. Click 'Next' on the welcome screen to begin.

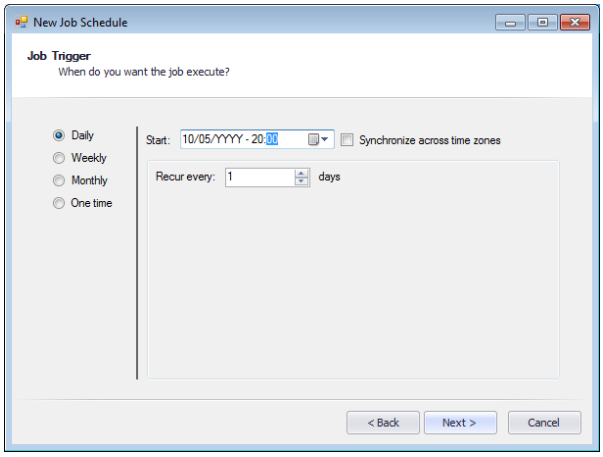
The second page allows the user to nominate a name for the schedule, and optionally a description. These will appear in the panel below the Jobs list once saved.

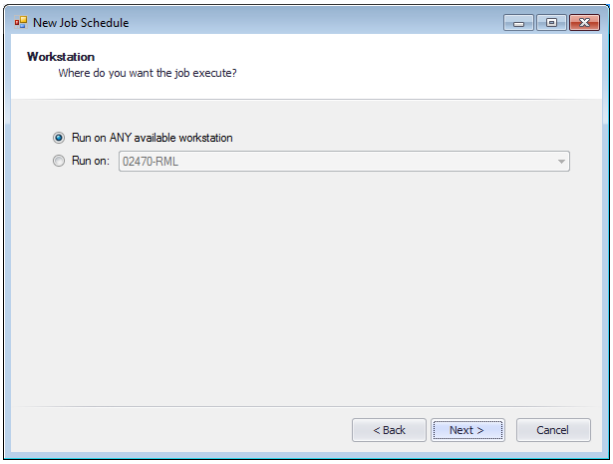

New Job Schedule
Welcome to the iConstruct Job Schedule wizard
This wizard simplifies the scheduling of a job by guiding you through a series of simple steps
To continue, click Next
< Back
Next >
Cancel


New Job Schedule
Create Job Schedule
Select the job, Name and Description
Use this wizard to quickly schedule a job.
Name: *
New Sample 1 - Batch Process Schedule
Description:
Batch processes all models each night
< Back
Next >
Cancel

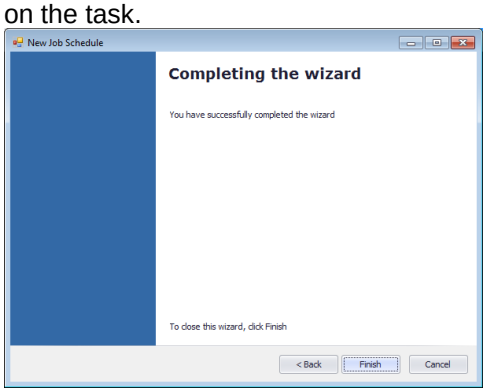
The next page configures when the job should run, in this case the default of daily is left checked as well as recurring each day, and the time is refined to start at 20:00 hours (8:00pm).

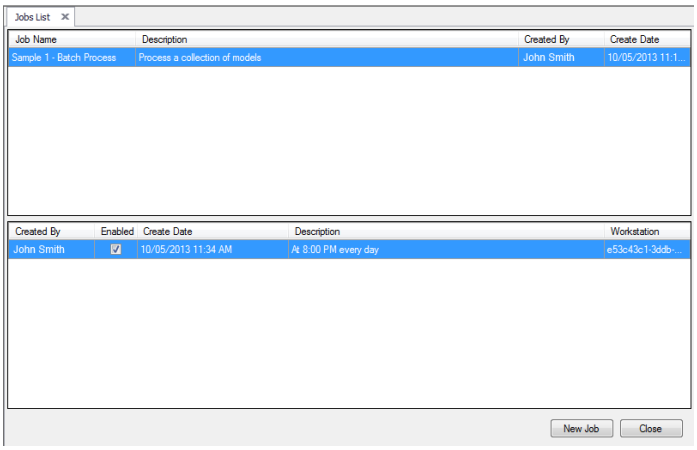
Following this we have the option to nominate a client PC to run the task on, or whichever is available. This allows the user to configure different machines for use on different jobs and make best use of the available resources.





The wizard will conclude with a confirmation page, click 'Close' and the scheduled task appears in the panel below the Jobs list. Tasks can be enabled, disabled or deleted from this panel by right-clicking on the task.

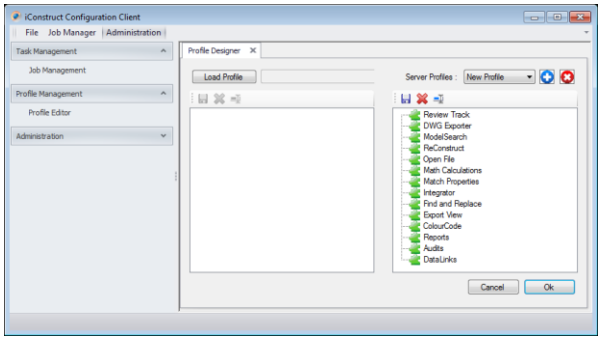


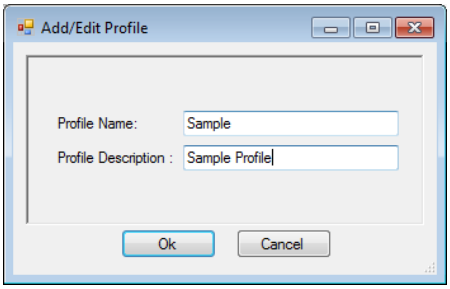


30.6 Profile Manager

Templates are made available to the workflow designer by importing iConstruct profiles (icp files) into the server through the profile manager. Note that once a template is used in a workflow, a copy of the template is made in the workflow – not a reference, so changing the template afterwards will not affect existing jobs.

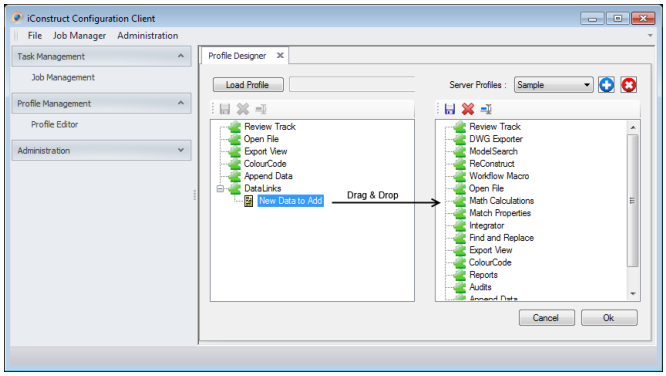
To create a new profile, click the blue plus '+' button on the right hand side, and the 'Add/Edit Profile' dialog will appear. Enter a profile name and optionally a profile description.





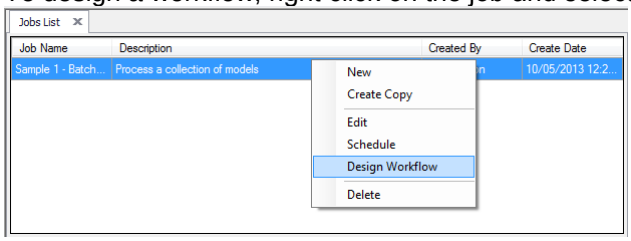
To import a template, switch to the server profile to use (in this case ‘Sample’) and load a profile using the ‘Load Profile’ button. Select the ICP file to use and the panel will populate with the available templates.

Move the desired template(s) from the left hand panel to the right hand panel. Click ok when done.

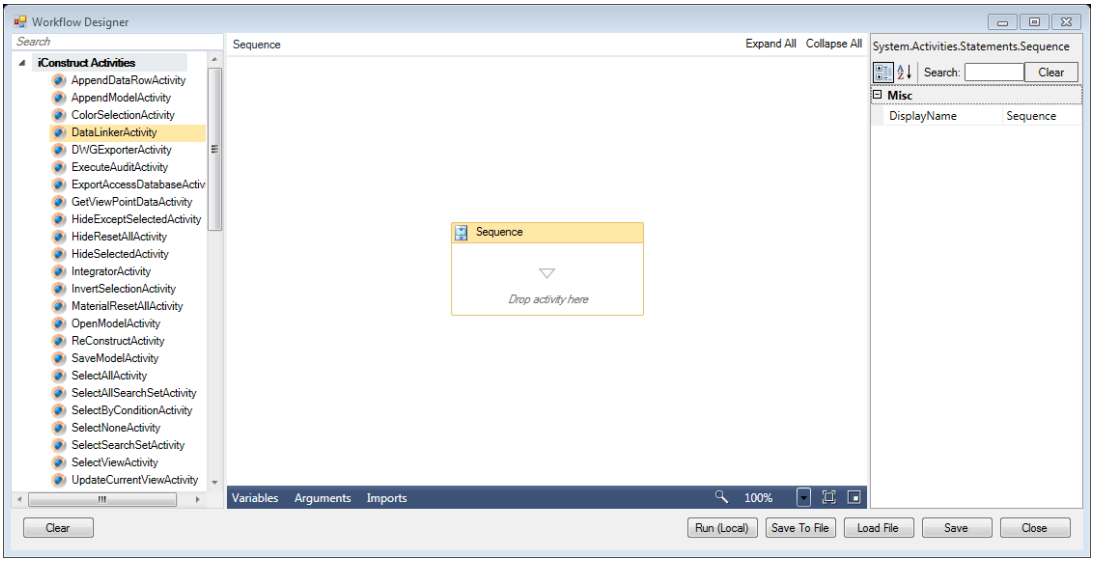


30.7 Workflow Designer

To design a workflow, right click on the job and select ‘Design Workflow’



The workflow designer window will load with an empty sequence.



On the left hand side are the activities that can be dragged and dropped into the main sequence. All activities and sequences have a display name property which can be changed to make the workflow more meaningful. It is also useful to know the workflow can be copied as an image by right-clicking the header and selecting ‘Copy As Image’, then paste into a document/image program.

The activities in the workflow designer often reference variables – these are defined in the ‘Variables’ panel at the bottom of the windows. The imports button is available for importing references to different data types.

Once a workflow has been created the ‘Run’ button is used to start the processing of the instructions, and a workflow monitor window will appear.

‘Save To File’ is used for exporting the workflow to an XAML file which can later be used as a macro button in the ‘Macro Configuration’ panel in iConstruct.

‘Load File’ loads an existing XAML file into the designer window.

‘Apply’ saves the updated workflow to the server.

‘Ok’ will close the workflow designer window, and save the changes.

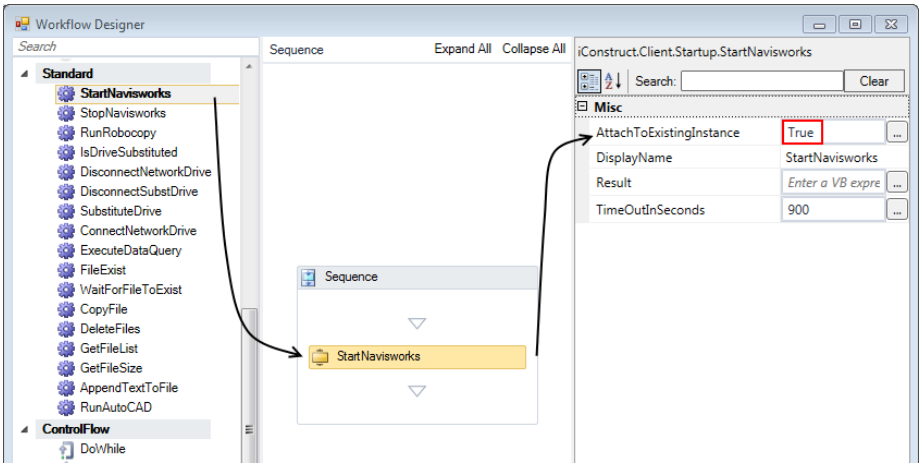
‘Cancel’ will close the workflow designer window, **without** saving changes.

30.8 Workflow Designer Walkthrough – Batch Processing

This walkthrough will give the reader a basic understanding of getting a list of available models from a directory, loading each model in turn and creating a new color-coded viewpoint with a comment.

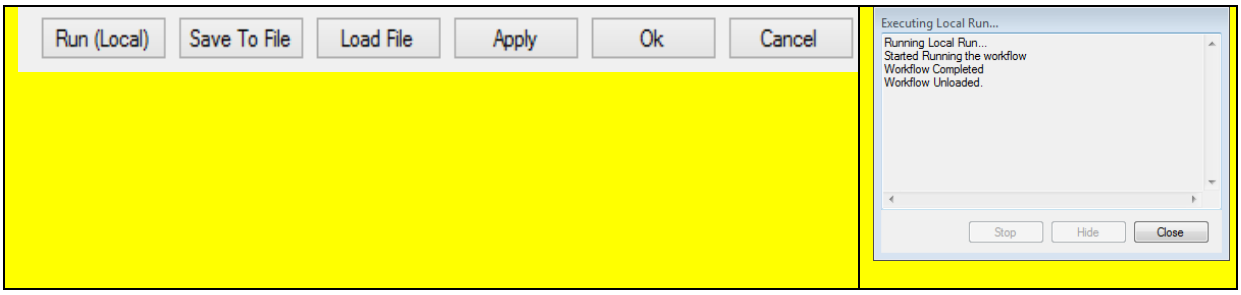
In this example we have a directory c:\iConstruct\ which contains 2 subdirectories ‘AreaA’ containing one model and ‘AreaB’ containing 2 models.

The first activity required is to start Navisworks – drag the ‘StartNavisworks’ standard activity from the left hand panel into the sequence as shown below. In this case the user is expected to have Navisworks open and run manually, so we will set the ‘AttachToExistingInstance’ to true.



To test the connection, make sure Navisworks 2014 is running, then click the ‘Run (Local)’ button at the lower right of the form – the ‘Executing Local Run…’ window will appear and display the output that the run has started, completed then unloaded (as we have not asked to do anything other than connect to Navisworks).

Note that if Navisworks 2014 is not available, the ‘Executing Local Run…’ window will wait until the timeout value is reached (default 900 seconds or 15mins). If this occurs and the windows appears to hang, just open Navisworks 2014 manually and the workflow will continue.



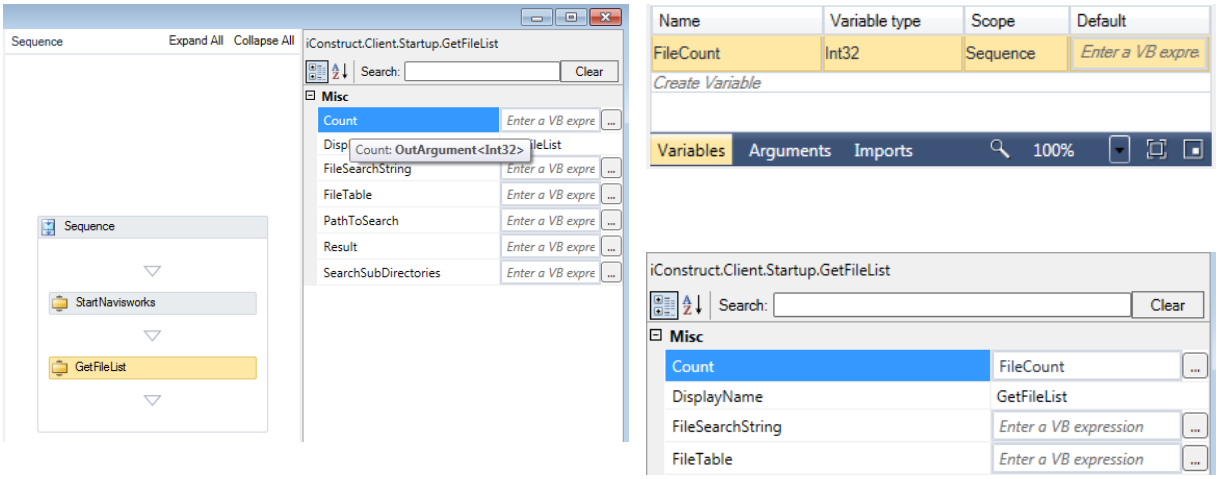
Once the connection is tested, click ‘Apply’ to save the progress so far. We can now add the next activity. Since the models are stored in a very basic folder structure (with no revisions or duplicates of models in subfolders) we can use the ‘GetFileList’ activity to get the filenames. In more advanced cases where the files are in a more complex structure, we can use excel or connect to an SQL database if the folder structure relates to a data source.

Drag the activity ‘GetFileList’ from the left hand panel to the arrow below the ‘StartNavisworks’ activity already in place.

The first parameter of the ‘GetFileList’ is ‘Count’ – this returns the number of files found. If this returns 0 then no files were found and the workflow should exit nicely. In order to identify which direction a

variable goes, and its datatype, hover over the description as shown. In this case we can see it is indeed an 'OutArgument' and is of type Int32. So in order to use this parameter we need to create a variable for it to use.

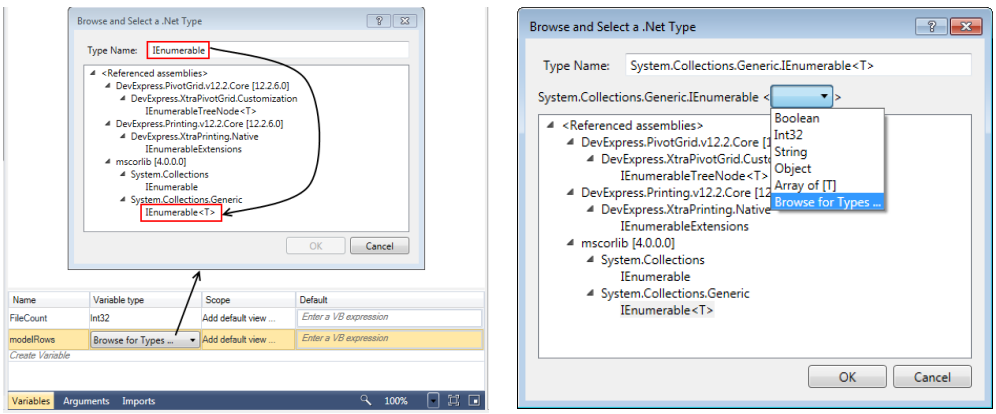
At the bottom of the Workflow Designer, click the 'Variables' button and the variables panel will appear. To create a variable click on the text 'Create Variable' and enter the details as shown – note that the scope denotes where the variable can be seen, not important for this example but if a variable goes 'missing' on more complex workflows this should be checked first. Once the variable has been added we can type the name 'FileCount' in the count parameter and use it in our workflow.



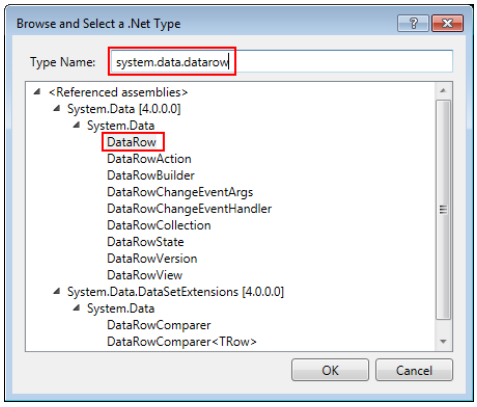
The next parameter 'DisplayName' is just used to describe the activity in the workflow panel – for this example we will change it to 'Get Models from folder', and while we're at it change 'Sequence' at the top, to 'Add default view to models'. In the 'FileSearchString' we will add "*.nwd" to search for Navisworks NWD files only (note we use quotes around literal text, whereas variables do not use quotes).

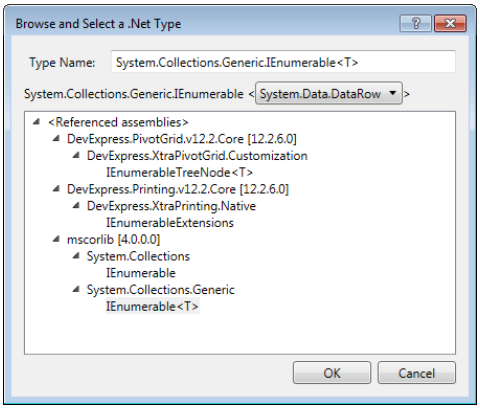
Following this is the parameter 'FileTable', which as we can see by hovering over the name, is another 'OutArgument' and in this case a IEnumerable<DataRow> which means it is a collection of rows for us to enumerate.

To create the variable for this parameter, again click on 'Create Variable' and enter the name i.e. 'modelRows', when selecting the 'Variable type' though, we need to choose 'Browse for Types…' which will bring up the type browser window. In the 'Type Name' box, enter 'IEnumerable' which will filter the types down. Click on 'IEnumerable<T>'



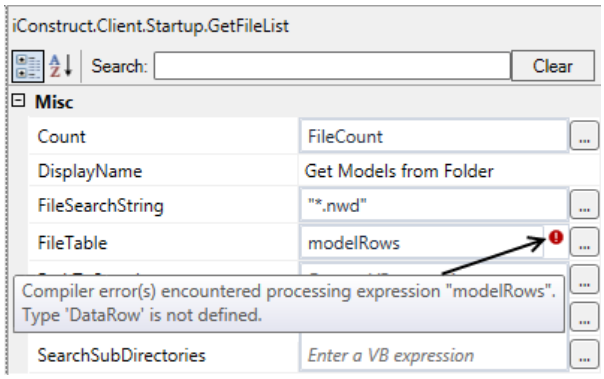
This will in turn add a new drop down list (see above) where we need to 'Browse for Types…' again and this time search for 'System.Data.DataRow'. The original type browser should now look like the image below left. Click 'Ok'.

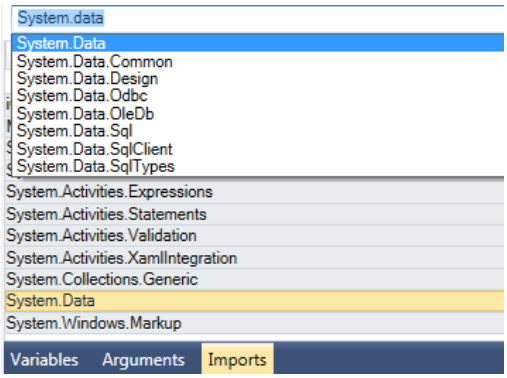




The variable name ‘modelRows’ can now be entered into the ‘FileTable’ parameter. Note that after entering the name a red exclamation mark appears in several locations in the workflow – this indicates something is wrong with the syntax or setup of the workflow. Hover over the red exclamation mark to see the error.

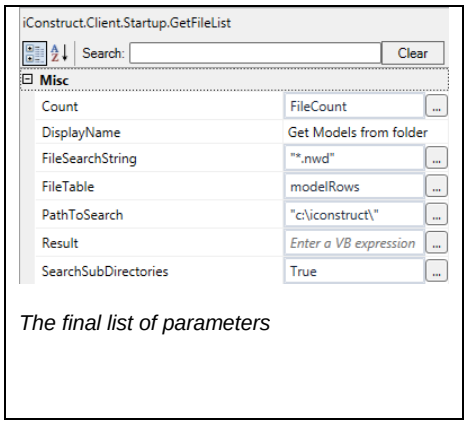
Often this can be a typographical error, in this case it’s because we haven’t referenced (Imported) the System.Data namespace. Switch to the ‘Imports’ panel, and in the ‘Enter or Select namespace’ box type ‘System.Data’ – click on System.Data in the list and it will appear in the Imports list.





Now when we look at the ‘FileTable’ parameter there is no red exclamation mark, indicating the variable used is accepted. Click the ‘Apply’ button to save our progress.

The next parameter is the ‘PathToSearch’ so we will add the text “c:\iconstruct\” as the root path. ‘Result’ can generally be left alone, especially in this case as we’re relying on the enumeration containing records to proceed. The final parameter is whether to search sub directories, in this case we do want to.

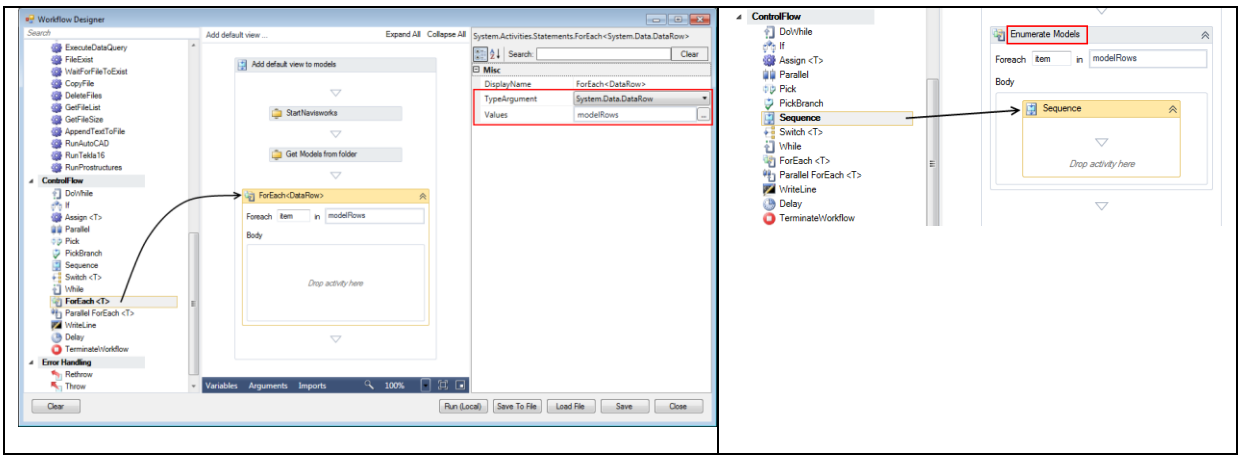


The final list of parameters

Now that we have our model data, we need to drag and drop the ‘ForEach’ controlflow activity beneath ‘Get Models from folder’. Notice that in the first instance red exclamation marks appear – this

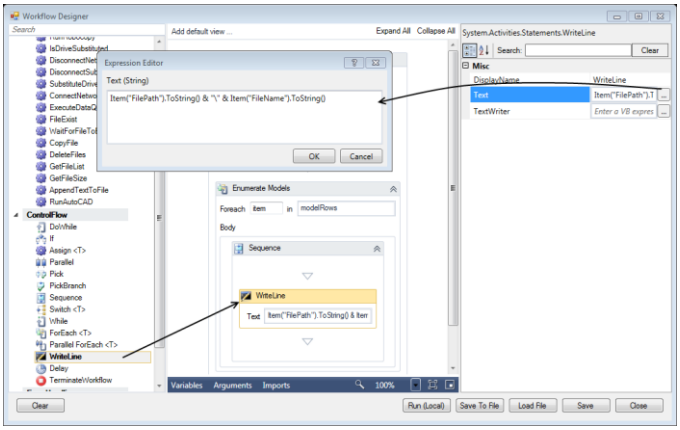
is because the ‘ForEach’ needs a variable to work with. Set the ‘TypeArgument’ to System.Data.DataRow and type ‘modelRows’ in the ‘Values’ parameter.

Then drag a ‘Sequence’ activity into the ‘Foreach’ loop, and rename the loop to something descriptive, i.e. ‘Enumerate Models’



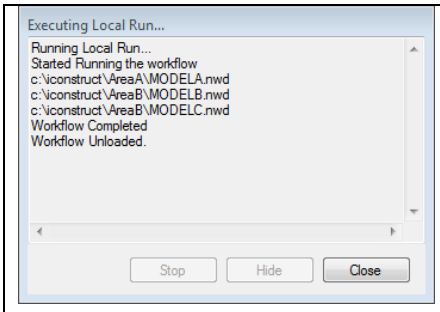
We can now test that we are able to read the file information by placing a ‘Writeline’ statement into the ‘Enumerate Models’ sequence. We do this by referencing the ‘Foreach’ variable, in this case ‘item’. So to write the detected file name we will type into the expression editor (click the browse … button to the right of the Text to bring up the expression editor, resize to suit).

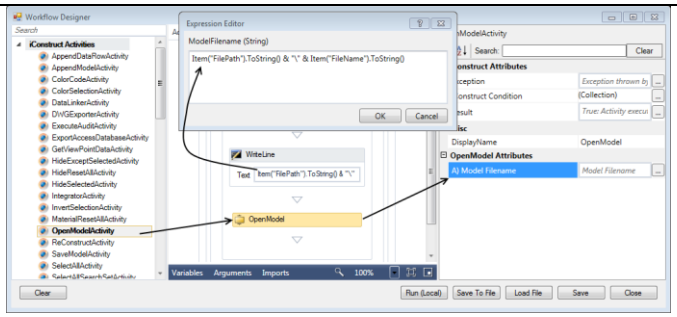
Item(“FilePath”).ToString & “\” & Item(“FileName”).ToString()



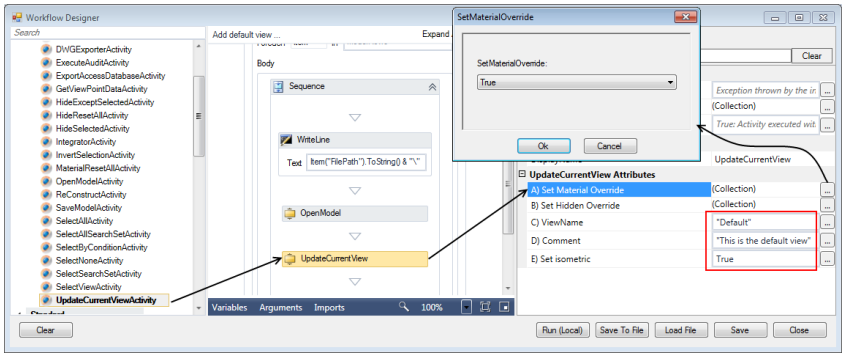
Refer to the ‘Standard Activities’ chapter for more information on the fields available from this activity.

Now we can test the workflow by clicking ‘Run (Local)’ – the workflow window will appear and list the full path and filename of the models in the subdirectories. Once we have verified this is the case, drag and drop an ‘OpenModelActivity’ to the sequence underneath the Writeline statement and copy & paste the writeline statement into the ‘Model Filename’ parameter. Click ‘Apply’ again to save our progress.

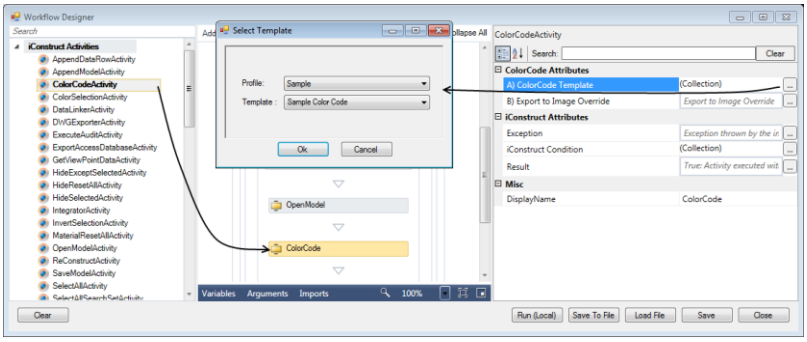




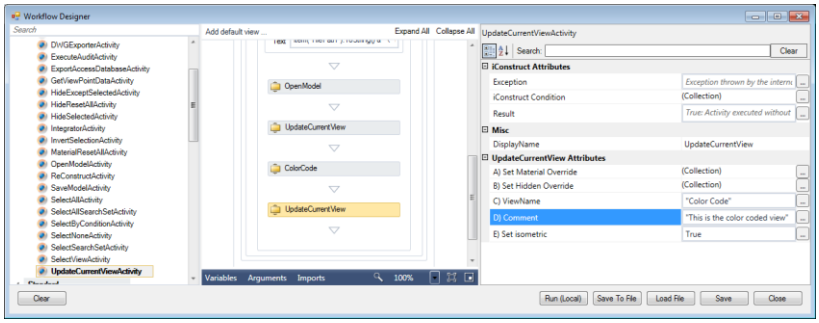
The purpose of this walkthrough is just to create a color coded default viewpoint and comment, before we add the color code activity it is best to capture the model as-is with its default colors. To do this we need to add an 'UpdateViewPointActivity'. If there is no current saved viewpoint set and a viewpoint name is nominated, this activity will create a new view in the model. Click on the browse button next to parameter 'Set Material Override' and set to 'True' – do the same for the 2nd parameter 'Set Hidden Override'. Sometimes when a parameter has '(Collection)' written in the argument field it means there are items to choose from. We can also add a 'ViewName' ("Default"), 'Comment' ("This is the default view") and 'Set isometric' (true).



Now we have the default view set, the next activity to add is the 'ColorCodeActivity'. Click the browse button to search for a color code template added using the Profile Manager (see above).



Now that the color code template is selected we can add another viewpoint for the color coded view. To save time right-click on the UpdateCurrentView activity, click 'Copy' then right click underneath the 'ColorCode' activity and paste it in. Edit the view name ("Color Code") and comment ("This is the color coded view"). Following this reset the colors back to their defaults before saving, so drag & drop the 'MaterialResetAll' after the color coded view creation.



The last step is to save the models, in this case we will save them to a different folder, to ‘c:\iConstruct_Output\’ where we have created empty ‘AreaA’ and ‘AreaB’ folders. To do this, drag and drop the ‘SaveModelActivity’ after the last step in the sequence, and set the ‘model filename’ parameter to:

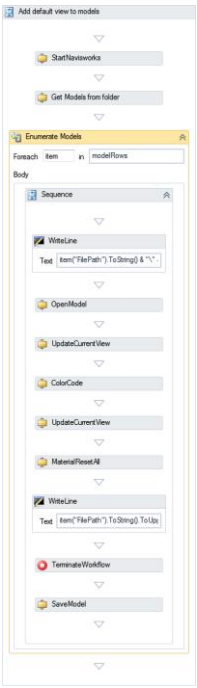
item("FilePath").ToString().ToUpper().Replace(“\ICONSTRUCT”,”\ICONSTRUCT_OUTPUT”) & "\" & item("FileName").ToString()

This changes the path from c:\iconstruct\ to c:\iconstruct_output\

Click ‘Save’ to save our progress.

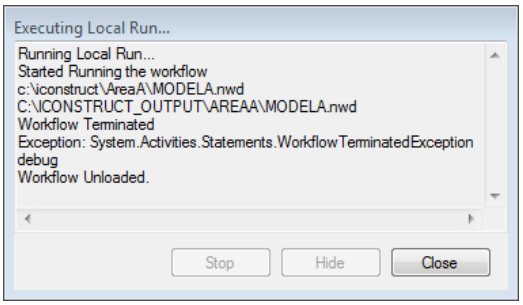
Before running the script in its entirety, it is a good idea to run the process just once – in the case that we have hundreds of files it is unwise to test the script on all of them. To stop the script at the desired location drag and drop the ‘Terminate Workflow’ activity into the place we want the script to halt – in this case just before the first save. The ‘Reason’ parameter is required to be filled out – in this case just type “debug” as we are just testing the script.

Also we will add a writeline before the terminate workflow so we can see the destination path will be correct. Copy the ‘model filename’ parameter from the ‘SaveModel’ activity into the ‘Writeline’ text parameter.

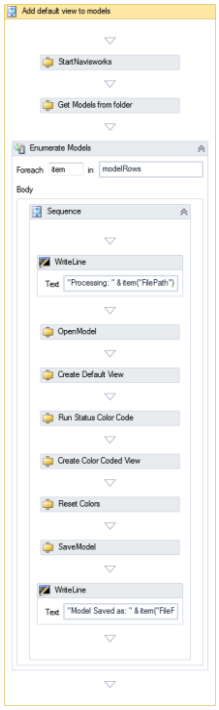


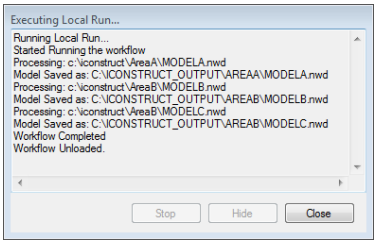
Our enumerate workflow now looks like the image on the left, for each model name we will open the model, create a default view, run the color code, create a color coded view, reset the colors then in this case output the destination filename and terminate the workflow before saving.

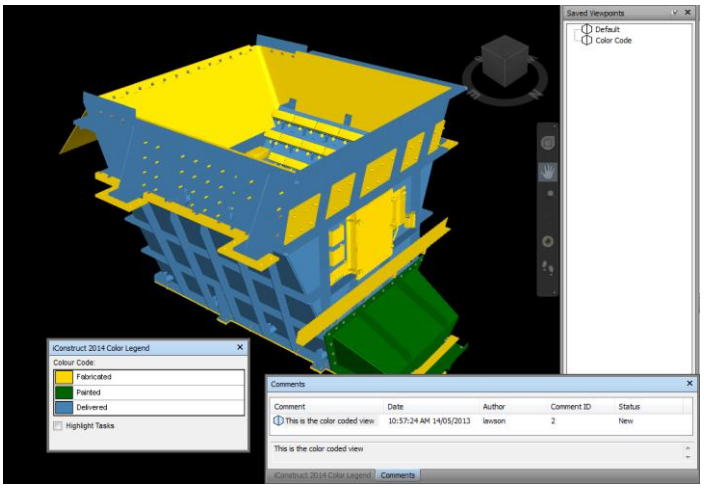
Running the workflow in this state produces the following output (note the termination generates an exception – this is normal).



Once the destination filename has been verified as correct, and that the color code ran and the viewpoints were created, remove the terminate workflow statement, update any of the headings of the activities, add or edit any of the writeline statements, then save the workflow.

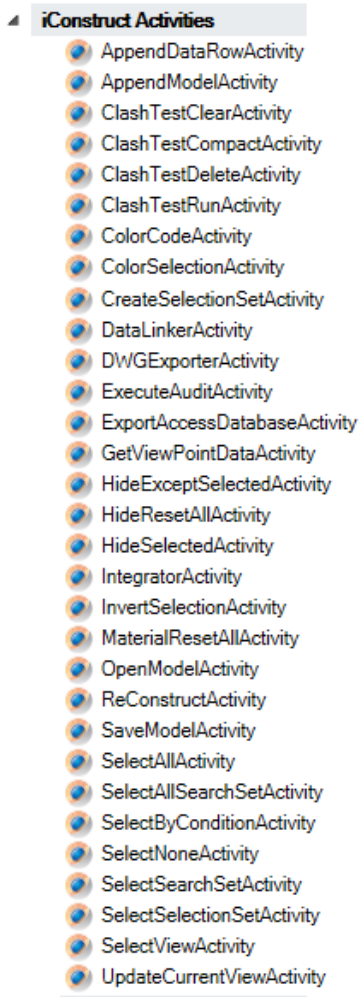

Add default view to models
StartNavisworks
Get Models from folder
Enumerate Models
Foreach item in modelRows
Body
Sequence
WriteLine
Text "Processing: " & item("FilePath")
OpenModel
Create Default View
Run Status Color Code
Create Color Coded View
Reset Colors
SaveModel
WriteLine
Text "Model Saved as: " & item("FileF


Executing Local Run...
Running Local Run...
Started Running the workflow
Processing: c:\iconstruct\AreaA\MODELA.nwd
Model Saved as: C:\ICONSTRUCT_OUTPUT\AREAA\MODELA.nwd
Processing: c:\iconstruct\AreaB\MODELB.nwd
Model Saved as: C:\ICONSTRUCT_OUTPUT\AREAB\MODELB.nwd
Processing: c:\iconstruct\AreaB\MODELC.nwd
Model Saved as: C:\ICONSTRUCT_OUTPUT\AREAB\MODELC.nwd
Workflow Completed
Workflow Unloaded.
Stop
Hide
Close


Saved Viewpoints
Default
Color Code
iConstruct 2014 Color Legend
Colour Code
Fabricated
Painted
Delivered
Highlight Tasks
Comments
Comment
Date
Author
Comment ID
Status
This is the color coded view
10:57:24 AM 14/05/2013
lawson
2
New
This is the color coded view
iConstruct 2014 Color Legend
Comments

31 Workflow Designer

31.1 iConstruct Activities



AppendDataRowActivity

Summary: Used to append a System.Data.DataRow to a IEnumerable<System.Data.DataRow>. This is useful, for example when iterating through a datasource and storing certain records for later use.

Parameter	Name	Description
A	DataRow to Append	The System.DataRow variable to append to the variable listed in B
B	Data	The variable name of the IEnumerable<System.Data.DataRow> container for the datarow.

AppendModelActivity

Summary: Used to append a model to the current Navisworks document

Parameter	Name	Description
A	Model Filename	Full path & filename of the model to append

ClashTestClearActivity

Summary: Clears the result of the nominated clash test, leave blank to clear all tests.

Parameter	Name	Description
A	Clash Test Name	If nominated, clears the clash test, otherwise clears all tests.

ClashTestCompactActivity

Summary: Compacts the nominated clash test, leave blank to compact all tests.

Parameter	Name	Description
A	Clash Test Name	If nominated, compacts the clash test, otherwise compacts all tests.

ClashTestDeleteActivity

Summary: Deletes the nominated clash test, leave blank to delete all tests.

Parameter	Name	Description
A	Clash Test Name	If nominated, deletes the clash test, otherwise deletes all tests.

ClashTestRunActivity

Summary: Runs the nominated clash test, leave blank to run all tests.

Parameter	Name	Description
A	Clash Test Name	If nominated, runs the clash test, otherwise runs all tests.

ColourCodeActivity

Summary: Runs the nominated Color Code template

Parameter	Name	Description
A	ColorCode Template	Color Code Template to run
B	Export to Image Override	Nominate a jpg file name to output the colour code image to

ColourSelectionActivity

Summary: Changes the colour & transparency of the selected items to the nominated RGB values.

Parameter	Name	Description
A	RedValue	Value in the range 0-255 for the red component of the colour
B	GreenValue	Value in the range 0-255 for the green component of the colour
C	BlueValue	Value in the range 0-255 for the blue component of the colour
D	Transparency	Value in the range 0-10 for the transparency of the selection (10=hidden)

CreateSelectionSetActivity

Summary: Creates a named selection set based on the current selection

Parameter	Name	Description
A	Selection Set Name	The name of the selection set (backslash denotes folder, which will be created if it doesn't exist, i.e. myfolder\myset)

DataLinkerActivity

Summary: Runs the nominated DataLinker template

Parameter	Name	Description
A	DataLinker Template	DataLinker Template to run
B	ACCDB File Override	Nominate a different ACCDB file to use (only use if template is set for Access). Note this option will automatically apply all fields from the table.

DWGExporterActivity

Summary: Runs the nominated DWG Export

Parameter	Name	Description
A	Output filename	TheDWG filename to write the geometry to
B	DWG Exporter Template	The DWG Exporter Template to use

ExecuteAuditActivity

Summary: Runs the nominated Audit template

Parameter	Name	Description
A	Audit Template	Audit Template to run

ExportAccessDatabaseActivity

Summary: Runs the nominated Access Database Export template

Parameter	Name	Description
A	Export Template	Export Template to run (must be Access – based)
B	ACCDB File Override	Override for the destination file

GetViewPointDataActivity

Summary: Collects the viewpoint information and returns a System.Data.DataTable object.

Parameter	Name	Description
A	Viewpoint Data	DataTable containing the field names ‘ViewName’, ‘FolderPath’ and ‘Index’.
B	Row Count	Number of views returned.

HideExceptSelectedActivity

Summary: Hides everything in the model except for the selected items.

HideResetAllActivity

Summary: Makes all items in the model visible

HideSelectedActivity

Summary: Hides the selected items

IntegratorActivity

Summary: Runs the nominated Integrator template

Parameter	Name	Description

A	Integrator Template	The Integrator template to run
B	Override Tab Name	Changes the name to use when creating the user data tab

InvertSelectionActivity

Summary: Inverts the current selection

MaterialResetAllActivity

Summary: Resets all overridden colours to the original object colours

OpenModelActivity

Summary: Opens a model. If there are any existing models in Navisworks they are cleared first (use AppendModelActivity to add a model to existing models).

Parameter	Name	Description
A	Model Filename	The full path and filename of the file to open

ReConstructActivity

Summary: Runs the nominated ReConstruct Template

Parameter	Name	Description
A	ReConstruct Template	The ReConstruct template to run
B	Output Filename	Nominate the destination NWD file name
C	Second Chance GroupBy Property	If the first group by property does not exist, try this second property instead of having the item go to 'NOGROUP'.
D	Partial Object Failure	An error was reported during ReConstruct – if this is true it's advised to run the template manually on the file and check for errors.

SaveModelActivity

Summary: Saves the current model (or collection of models) to the nominated NWD filename.

Parameter	Name	Description
A	Model Filename	The full path and filename of the file to save to

SelectAllActivity

Summary: Selects all the items in a model.

SelectAllSearchSetActivity

Summary: Selects all the items in all search sets listed in an Audit Template

Parameter	Name	Description
A	Audit Template	The Audit Template to use

SelectByConditionActivity

Summary: Selects one or more items by nominated values. The Conditions work in the same way as Navsiworks 'Find Items' panel. Use 'Search Within Selection'/'Add result to current selection' to replicate AND / OR.

Parameter	Name	Description
A	Attribute Name	The attribute name to search on
B	Property Name	The property name to search on (if required)

C	Value	The value to search for (if required)
D	Condition	The condition (Equals, Contains, Defined, Undefined)
E	Search Within Selection	Apply search only to items already selected
F	Add result to currentselection	Add the results of the search to the currently selected items.
G	PathCount	The number of paths (selected nodes in selection tree) returned

SelectNoneActivity

Summary: Deselects any selected items

SelectSearchSetActivity

Summary: Selects items based on a nominated search set name within an Audit template

Parameter	Name	Description
A	Audit Template	The Audit Template to use
B	SearchSet Name	The search set to use for the selection

SelectSelectionSetActivity

Summary: Selects items based on a nominated selection set or search set name

Parameter	Name	Description
A	Selection Set Name	The selection or search set name to use

SelectViewActivity

Summary: Activates a nominated viewpoint

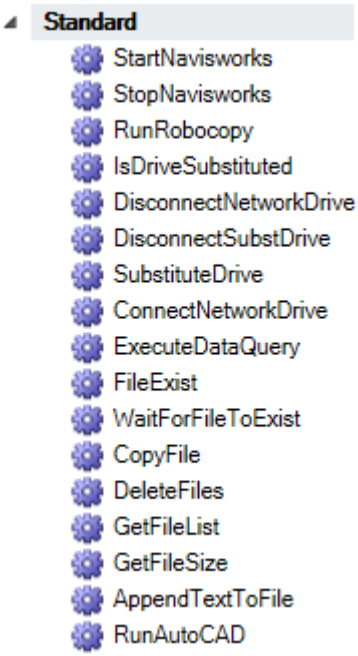
Parameter	Name	Description
A	View Name	Show the first view matching the name
B	View Index	Show the view with the given index (1 = first view)
C	View Count	The number of views found (if View Name used to search)
D	ViewWasFound	Boolean value indicating if a view was found matching criteria

UpdateCurrentViewActivity

Summary: Updates the currently selected viewpoint's material and hidden override with the active view state. If no saved viewpoint is current, this command has no effect unless the 'ViewName' parameter is set, in which case a new viewpoint is created (use backslash to denote folders i.e. "MyFolder\MyView"). If the comment field is set, a new comment will be added to the view with the contents.

Parameter	Name	Description
A	Set Material Override	Sets the material override option for the view
B	Set Hidden Override	Sets the hidden override option for the view
C	ViewName	Name to use when creating a new view
D	Comment	Text to add to view as a comment
E	Set isometric	Sets view to zoomed extents isometric if creating a new view

31.2 Standard Activities



StartNavisworks
Summary: Begins a Navisworks session, optionally connects to the existing running Navisworks instance. If the option to attach to the existing is set to false, any running Navisworks processes will be terminated.

Parameter	Description
AttachToExistingInstace	If set to true, connects to the running instance of Navisworks 2014. If no instance is running, the workflow will wait until the user opens Navisworks. If set to false, terminates any running Navisworks processes and launches a new instance of Navisworks
TimeOutInSeconds	Time to wait until failure if Navisworks is not found
Result	Returns 'true' if successfully connected, 'false' if connection failed.

StopNavisworks
Summary: Terminates the connected Navisworks session (if AttachToExistingInstace is false, otherwise this has no effect).

RunRobocopy
Summary: Runs the robocopy command (to perform file/folder copying) with the given arguments. For basic single file copying use CopyFile instead. An example argument would be (include quotes as the argument is passed as a string):
"c:\mymodels\ c:\destination_models\ *.dwg /LOG:robocopy.log"
Run robocopy /? From the command line to see all available switches. Note if directories have spaces the user will need to use two double quotes in the argument i.e.
""c:\my models\"" ""c:\destination models\"" *.dwg /LOG robocopy.log"

Parameter	Description
Result	If there is a problem starting the Robocopy process this returns false otherwise true – note that this routine does not analyse Robocopy's output and therefore if there are problems copying files etc it is recommended to use the log file option and review afterwards.
Arguments	The arguments to use for the robocopy process

IsDriveSubstituted

Summary: Indicates if a given drive letter is substituted using the SubstituteDrive command, as opposed to a mapped network or local drive.

Parameter	Description
Result	Returns true if drive is substituted, false if it is not
DriveLetter	The drive letter to check i.e. “t:”

DisconnectNetworkDrive
Summary: Disconnects the nominated network drive.

Parameter	Description
Result	Reports false if no attempt could be made to disconnect the drive (does not check if disconnect was successful)
DriveLetter	The network drive letter to disconnect i.e. “t:”

DisconnectSubstDrive
Summary: Disconnects the nominated substituted (by using the SubstituteDrive command) drive.

Parameter	Description
Result	Reports false if no attempt could be made to disconnect the drive (does not check if disconnect was successful)
DriveLetter	The substituted drive letter to disconnect i.e. “t:”

SubstituteDrive
Summary: Substitutes the nominated folder to a drive letter using the SUBST command (for further information see http://technet.microsoft.com/en-us/library/bb491006.aspx).

Parameter	Description
Result	Reports false if no attempt could be made to substitute the drive (does not check if substitution was successful)
DriveLetter	The drive letter to map to – note this drive letter should not exist before running this command
PathToMap	The folder to map to the nominated drive letter

ConnectNetworkDrive
Summary: Maps a server path to the nominated drive letter, similar to mapping a network folder in Windows Explorer

Parameter	Description
Result	Reports false if no attempt could be made to map the drive (does not check if map was successful)
DriveLetter	The drive letter to map to – note this drive letter should not exist before running this command
ServerPath	The UNC path of the network share to map to i.e. \\servername\sharename

ExecuteDataQuery
Summary: Queries a datasource for a list of records (IEnumerable<System.Data.DataRow>).
Example Connection string / query for connecting to an Excel file:
"provider=Microsoft.ACE.OLEDB.12.0;Data Source=""c:\data\myexcel.xlsx"";Extended Properties=""Excel 8.0;HDR=Yes;IMEX=1"""
Query: "select * from [Sheet1$]"
Examples Connection string / query for SQL server with/without windows authentication:
"data source=sqlservername; database=databasename;"
"data source= sqlservername;uid=username;password=password;database= databasename;"
Query: "select * from [myTableName]"

Parameter	Description
ConnectionString	The connectionstring for the data source (see examples above)

Count	The number of DataRows returned
Query	The query for the datasource (see above for examples)
Result	Returns the IEnumerable<System.Data.DataRow> object to use with the 'Foreach' ControlFlow

FileExist
Summary: Checks if a file exists

Parameter	Description
Result	Returns true if file exists, or false if file does not exist
FileName	The full path and filename to check the existence of

WaitForFileToExist
Summary: Waits for a file to be created and available (i.e. if a large file, will wait until the file has finished being written to).

Parameter	Description
Result	Returns true if file was created within the timeout, or false if it did not
FileName	The full path and filename to wait for the creation of
TimeOutInSeconds	The length of time to wait for the file to be created

CopyFile

Summary: Copies a single file, for advanced file/folder copying, use RunRoboCopy instead.

Parameter	Description
CopyResult	Returns true if the file copy succeeded, false if it did not
DestFile	The full path and filename to copy the sourcefile to
OverWrite	Set to true to overwrite an existing file of the same name, or false to cancel file copying if a file of the same name already exists
SourceFile	The full path and filename of the file to copy

DeleteFiles

Summary: Deletes a nominated file or files from a nominated path based on a wildcard search pattern. This command should be used with caution as there is no confirmation once it is called.

Parameter	Description
Result	Returns true if there were no errors during the deletion process
Path	The full path to search for the files to delete
SearchPattern	Either the filename or a wildcard pattern to delete the files i.e. "myfile.dwg" or "*.bak"

GetFileList

Summary: Gets a list of files from a nominated directory (and optionally subdirectories) and returns the list in the variable of type IEnumerable<System.Data.DataRow>
The fields returned are as follows:

Field	DataType	Description
FileName	String	The name of the file
FilePath	String	The path to the file
FileSize	Int	The size of the file in bytes
FileModifiedDate	DateTime	The last date & time the file was written to
FileCreatedDate	DateTime	The date & time the file was created

Parameter	Description
Count	Returns number of rows in the returned IEnumerable

FileSearchString	The wildcard search to use i.e. “*.dwg”
FileTable	Returns the IEnumerable<System.Data.DataRow>
PathToSearch	The root path to start the search
SearchSubDirectories	True to search subdirectories, False to only search current

GetFileSize

Summary: Gets the size (in bytes) of the nominated file.

Parameter	Description
FileName	The full path and name of the file to return the size of
FileSize	Returns the size of the file, in bytes

AppendTextToFile

Summary: Appends a line of text to a nominated file. This command is useful for logging information during processing.

Parameter	Description
TextFileName	The full path and name of the file to append the text to
TextToAppend	The string of text to append
Result	Returns true if append was successful, false if not

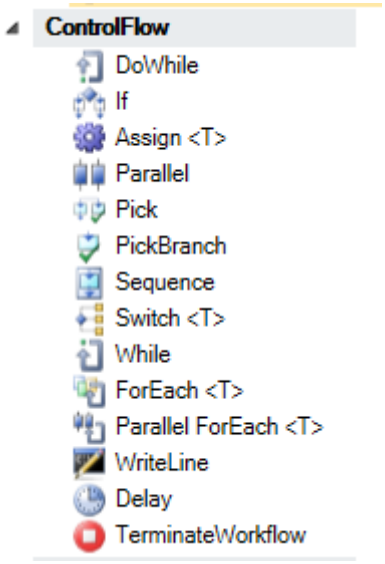
RunAutoCAD

Summary: Launches AutoCAD, if installed, with the given start arguments. Useful if the workflow needs to process DWG files using a custom AutoCAD script or command, before reading with Navisworks for further processing.

Parameter	Description
AcadStartArguments	The command line arguments to start AutoCAD.
PathToAcadExecutable	The path to Acad.exe
Result	Returns true if no errors starting the process, false if there was an error or timeout
TimeOutInSeconds	The amount of time to wait before terminating the Acad.exe process (i.e. if a script is expected to complete within 5mins, set this to ensure the workflow doesn’t stop indefinitely)

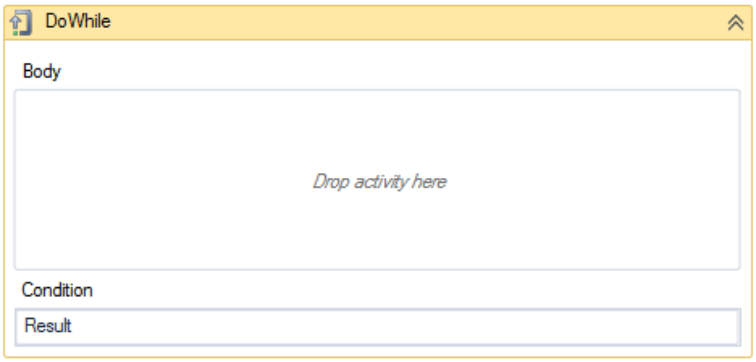
31.3 ControlFlow Functions

The control flow functions are documented in the Microsoft Workflow Designer documentation at the following link: http://msdn.microsoft.com/en-us/library/ee829560.aspx. These descriptions give a brief summary for convenience.



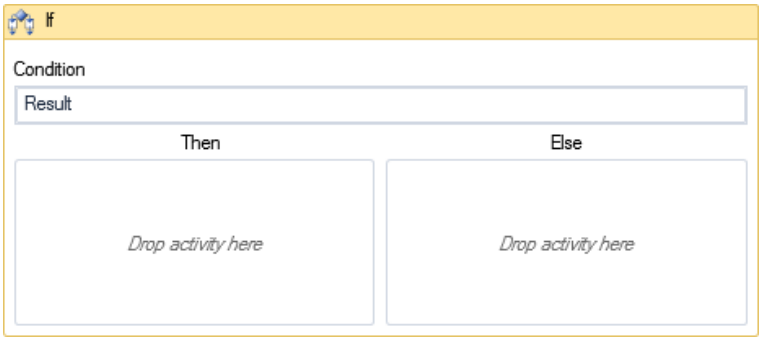
DoWhile

Loop through the actions listed in the DoWhile Body while the Condition is true. The test on the condition is done at the end of the first loop so the loop is entered at least once.



If

If result is true, perform the activities in 'Then', otherwise perform the activities in 'Else'



Assign

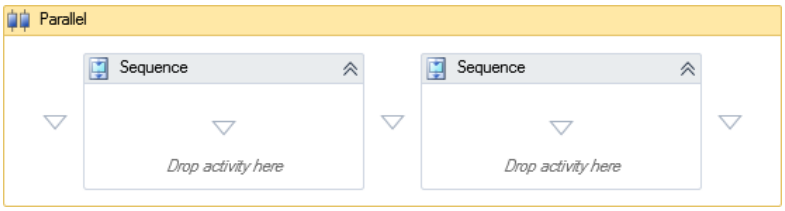
Assign a value to a variable

Parameter To – The variable to assign the value to

Value – the specified value to assign to the variable

Parallel

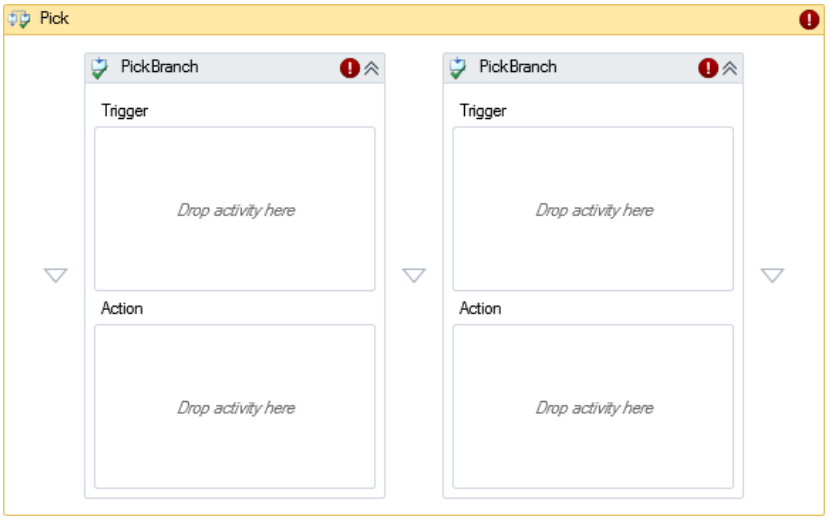
Runs through one or more sequences, waiting until all are complete before progressing. Note this function does not actually run the sequences simultaneously.



Pick / PickBranch

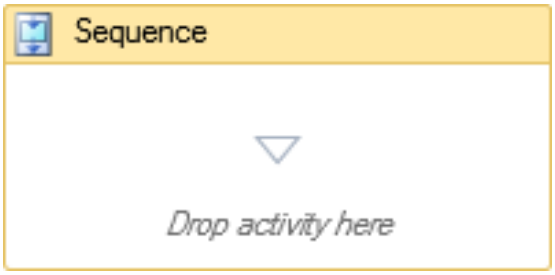
A pick container contains 2 or more PickBranch objects. The trigger is the completion of an event.

For example an activity is placed in the first branch trigger and a 'Delay' is placed in the second, set to 10 seconds. If the first activity in the first branch does not complete within 10 seconds then the delay activity action will occur.



Sequence

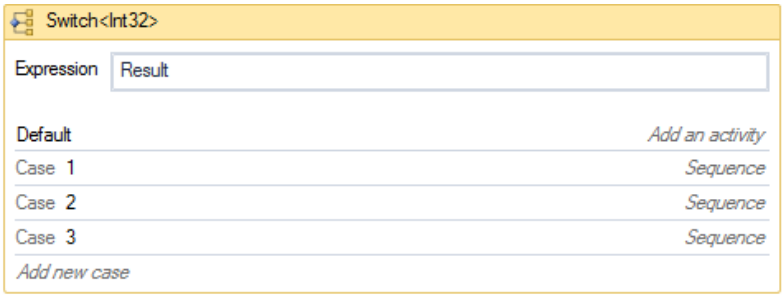
A sequence is a container for multiple activities. By default where a container states 'Drop activity here' only one activity is allowed. By dropping the Sequence activity several activities can occur.



Switch

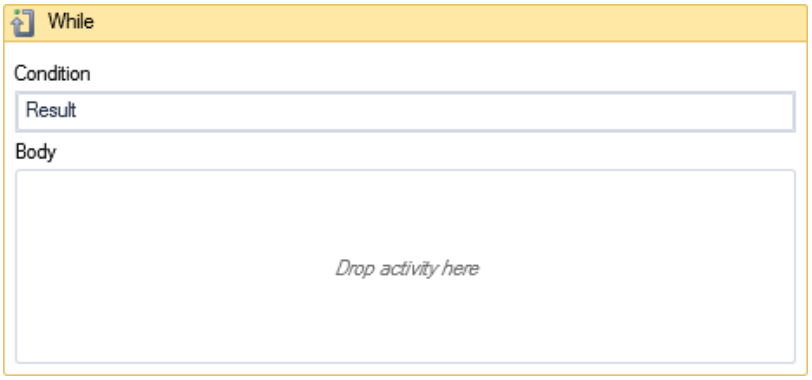
Evaluates an expression against given possible cases, and performs the sequence relevant to the case. Used in a similar fashion to If/Else but where there are more than 2 possibilities.

For example if there are 3 types of items in a field and an IEnumerable is being enumerated, different actions can be assigned depending on which one.



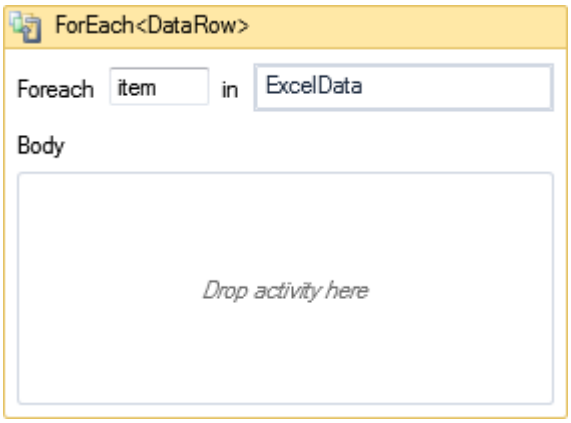
While

Loop through the actions listed in the DoWhile Body while the Condition is true. The test on the condition is done at the start of the first loop, so if it is not true to begin with the loop will not be entered.



ForEach<T>

Used to enumerate an IEnumerable, for example each row of an Excel file returned from 'ExecuteDataQuery'



Delay

Suspends the processing of the current body/sequence for a given amount of time.

Parameter Duration – time to delay in milliseconds

TerminateWorkflow

Terminates the workflow at this point.

Parameter Exception - Reserved

Parameter Reason – Text to display to the user on termination.

32 Smart DWFx Exporter

32.1 Overview

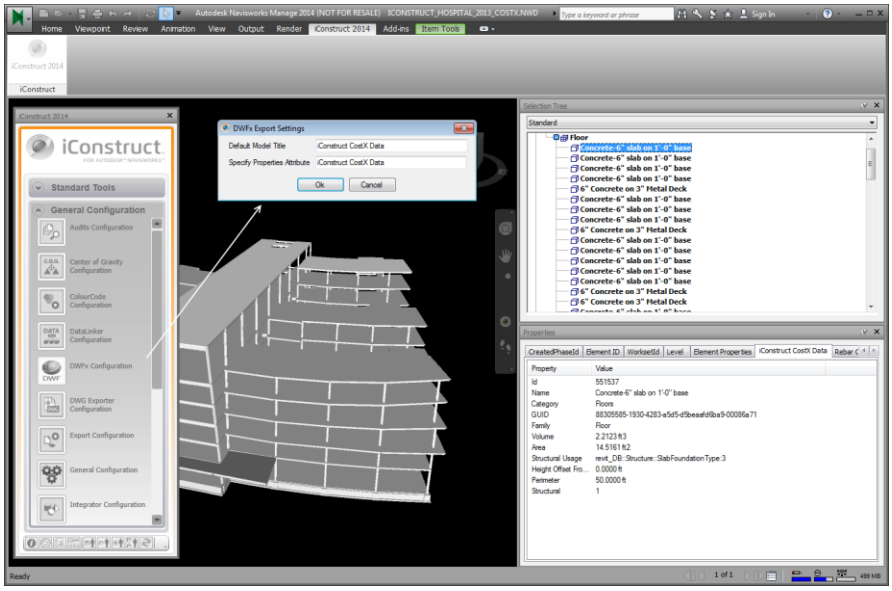
Smart DWFx Exporter is a new tool which leverages the inbuilt Navisworks DWFx export function but gives the user a bit more control. Smart DWFx Exporter was originally intended for use with CostX – first preparing the models into a consistent format then exporting using the Smart DWFx Exporter tool in order to bring into CostX for estimation.

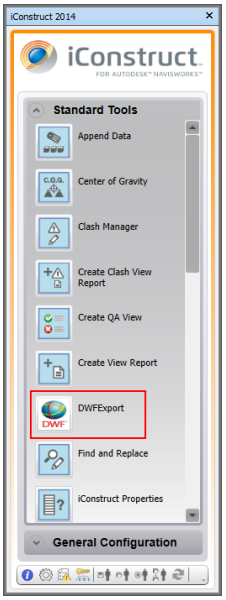
The tool performs 3 functions:

- Ensures all data from the model is brought across correctly into the DWFx file
- Formats Revit data properties to append the units as text so DWFx-compatible quantity estimation packages like CostX can make use of them.
- Allows for a single nominated data tab to be brought across into the DWFx, purging other properties and therefore allows for a smaller file size

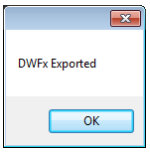
32.2 Example

In the image below we have a Revit model that has been processed, in this example there are 26 different property tabs for the selected item, one of which is our Integrator-applied user data tab 'iConstruct CostX Data'

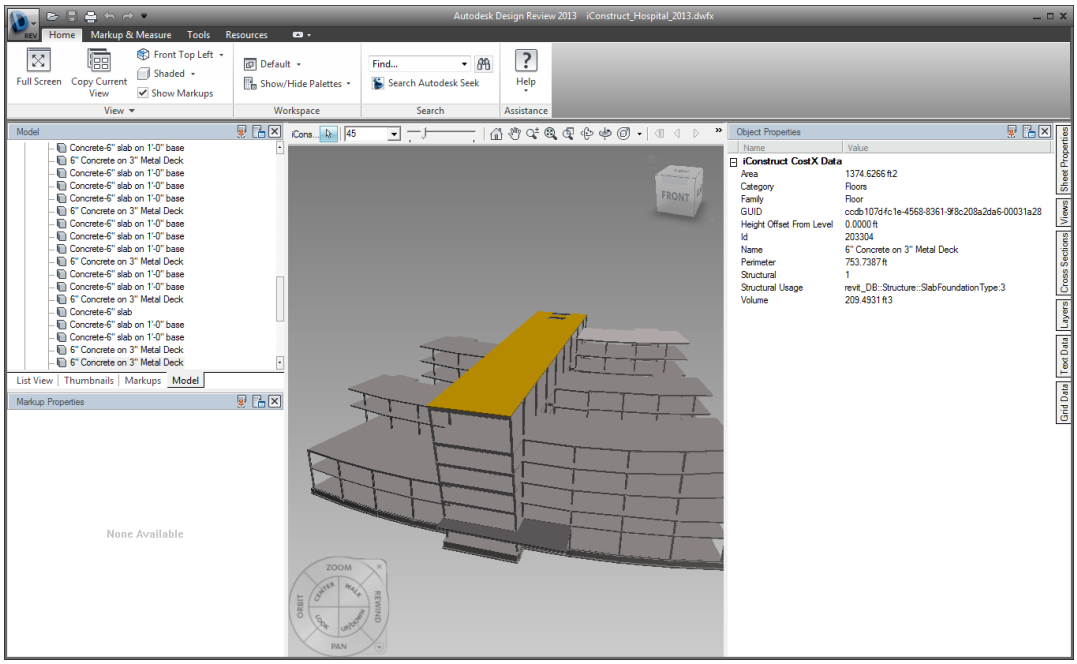




Once configured, select the parts of the model the user wish to export and click the ‘DWFxExport’ button and a ‘Save As’ dialog box will appear, select a file name and the routine will run. Once completed a confirmation box will appear.



The user may now open the DWFx in CostX, Autodesk Design Review or any other DWFx-compliant software package.

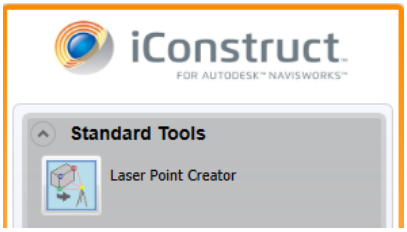


33 Laser Point Creator

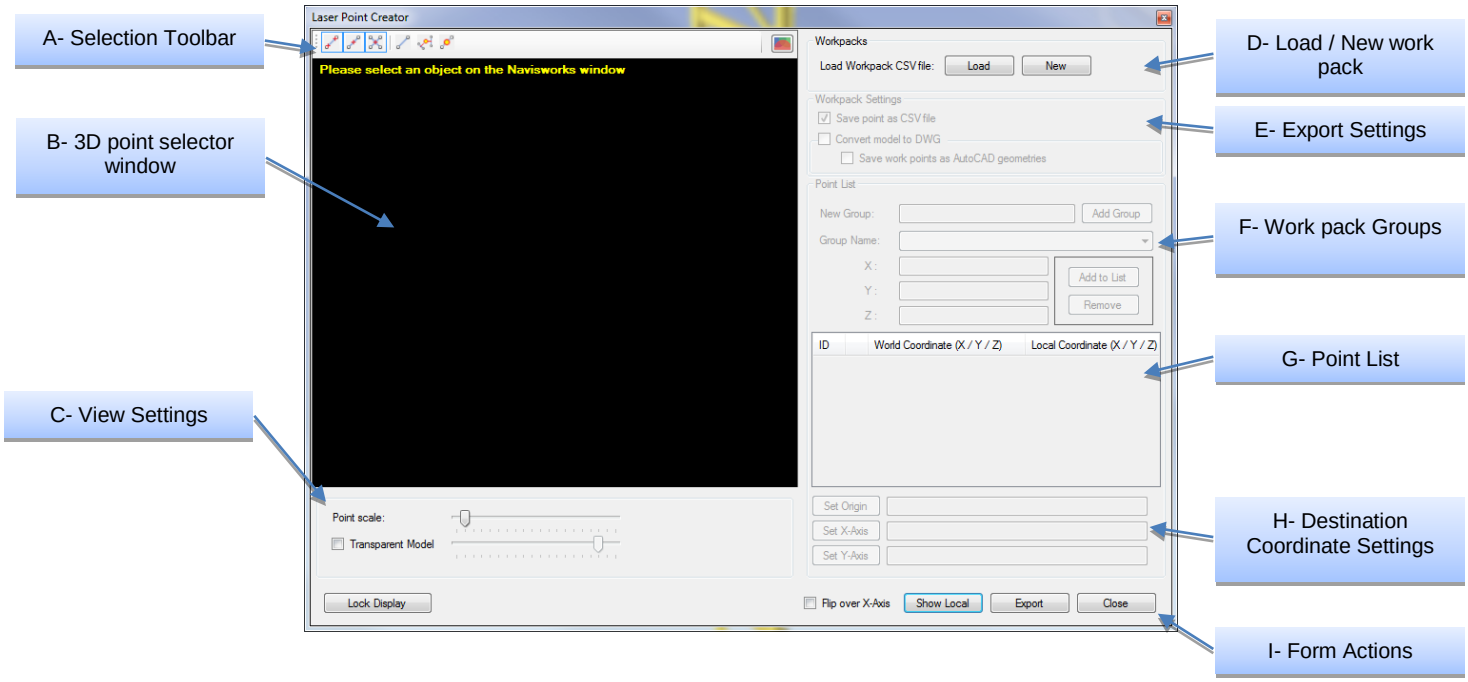
A brand new feature in iConstruct 2015 is Laser Point Creator plugin. Laser Point Creator for iConstruct is designed for engineers, fabricators or model reviewers utilizing Navisworks and needing the ability to easily create 3D field points within their preferred design model. Working as a plugin within Navisworks, Laser Point Creator provides fluid creation of field points for any points including end points, mid points, line intersections, and perpendicular intersections of 3D lines.

33.1 Abstract

Laser point creator in Navisworks generates 3D points by proving a visual point selection tool to the user which facilitates point selection in the 3D space.



Laser Point Creator plugin is part of iConstruct Standard Tools. The plugin main window consists of the following sections:



A- Selection Toolbar: Enables end-point, Mid-Point, Intersection Point, Auto-Mid Point, and Perpendicular selection features. Also provides a draw line feature to facilitate point definition, for example to select the center point of a rectangle, the user can draw a line from one corner to the opposite corner and select the mid-point by enabling the 'mid-point' feature, or simply use the 'auto-mid-point' feature and pick two corners and the mid-point of the 'virtual' line from the selected vertices will be highlighted.

B- 3D point selector window: A 3D port which empowers the object selection in Navisworks. The selected geometry in this view port will be rendered in a wire frame format and the user has the ability to pick 3D points by enabling the toolbar features.

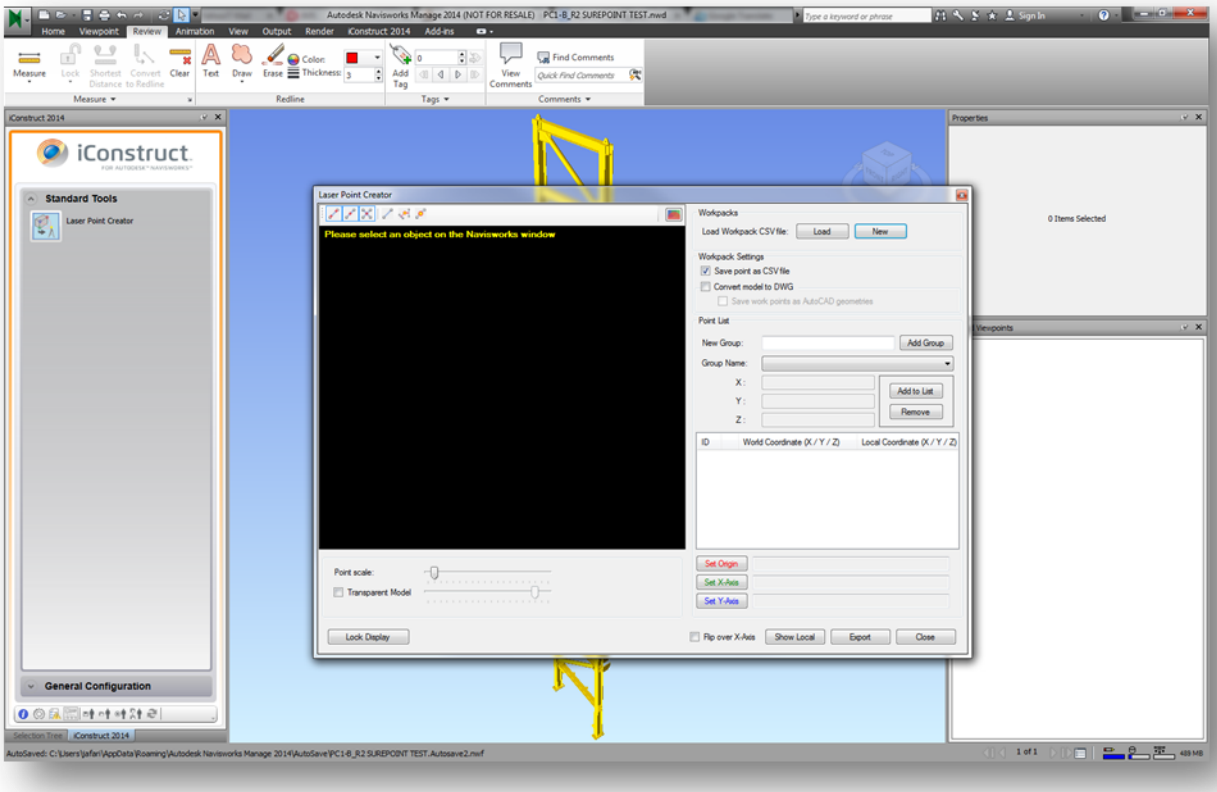
C- View Settings: The user can scale the point size, change the transparency of the model to highlight the points or lock the view on the selected object / camera settings.

D- Load/New work pack: Laser Point Creator can export work pack points into a CSV file. Using this section the user can load a saved work pack file into the existing model.

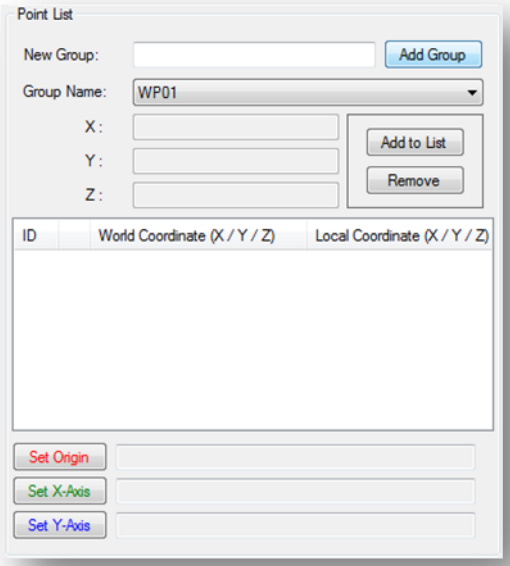
E- Export Settings: Apart from CSV format, Laser Point Creator can export the model after transforming the visible objects, using a defined coordinate system, into a DWG file using the DWG Exporter plugin.
F- Work pack Groups: Each point can be categorised into different work pack groups, the user can define multiple groups for each work pack.
G- Point list: Points added to the work pack will be displayed here
H- Destination Coordinate system: If the user wants to rotate the model based on a new user-defined coordinate system, it is possible to drag / drop points from the point list into the X, Y and origin point of the new coordinate system.
I- Form Actions: If the new coordinate system is selected, the user can view the model in the new coordinate system, and rotate the model over the X axis. This is also where the user has the ability to export the model based on the settings in the 'Export Settings' section.

33.2 Creating Points

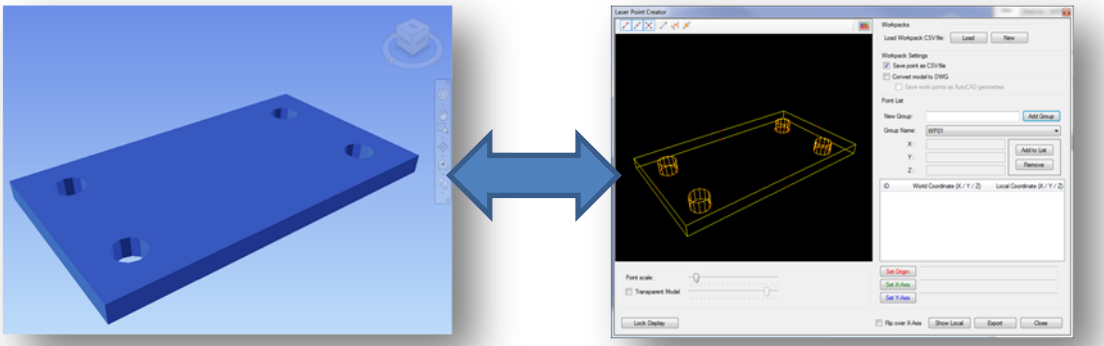
To create a new work pack on a model, after running the 'Laser Point Creator', press 'New'.



To create a new group, type the group name in the 'New Group' text box and press the 'Add Group' button:



Select the object that the user want to add a point to. The wireframe format of the object will be displayed in the 3D view window:



To add a point, the user must first pick a 3D point in the 3D view.

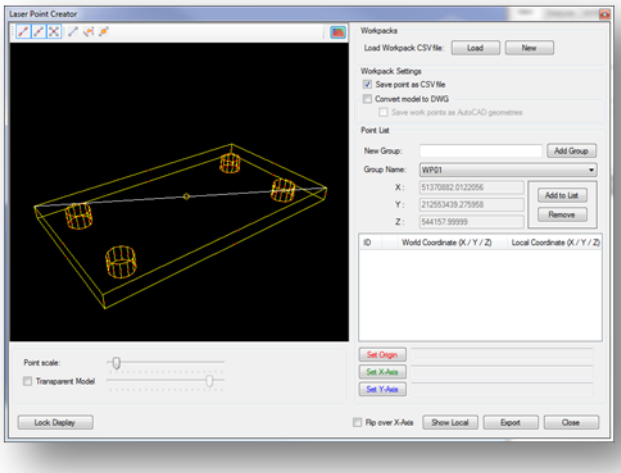
- To select the end point of a line (or edge) make sure the ‘Snap to End-Points’ button is highlighted.
- To select the mid-point of a line (or edge) make sure the ‘Snap to Mid-Points’ button is highlighted.
- To select the intersection of two lines (or edges) make sure the ‘Snap to Intersections’ button is highlighted.

Note: The border of the button is blue when highlighted.

There are three other commands available in the toolbar:

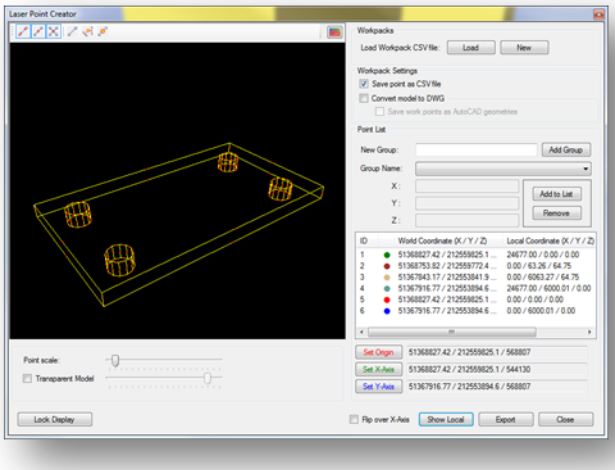
- Draw Line: The user can draw ‘lines’ using standard point selection commands.
- Perpendicular Intersection: by selecting two edges (mid-points) this command highlights the perpendicular intersection for those lines.
- Auto-Mid-Point: by selecting this option and picking two other points, this command highlights the mid-point of the virtual line from those points.

After selecting a 3D point in the 3D window, the point coordination values will be displayed in the X, Y, Z text boxes:



Now press ‘Add to List’ to add the selected point into the ‘point-list’. The same process can be repeated for all the required points in the model.

To define a new coordinate system, drag the origin point from the point list into ‘Set Origin’ text. Do the same for X and Y axis.



The result of the new coordinate system can now be seen by triggering the ‘Show Local’ button. To save the points into a CSV file, export the point list by pressing the ‘Export’ button.

Laser Point Creator also enables exporting model / points into DWG file format. This option is available if users set the ‘Convert model to DWG’ check box.

Please note that the export feature only works if the Origin, X-Axis, and Y-Axis points are defined.

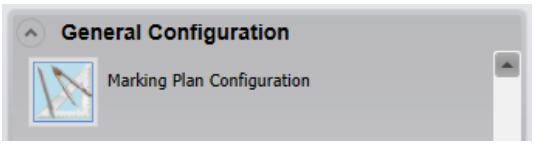
34 Dynamic Labeller

Another new feature in iConstruct 2015 is the 'Dynamic Labeller' plugin. Dynamic Labeller allows the user, to attach 2D tags to the 3D items within a Navisworks model, visually identifying the items by their property values. It can also export the model along with visible tags, as a high-resolution image.

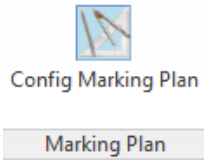
Dynamic Labeller allows users to quickly add property labels to the view and optionally save as a Navisworks marked up viewpoint.

34.1 Abstract

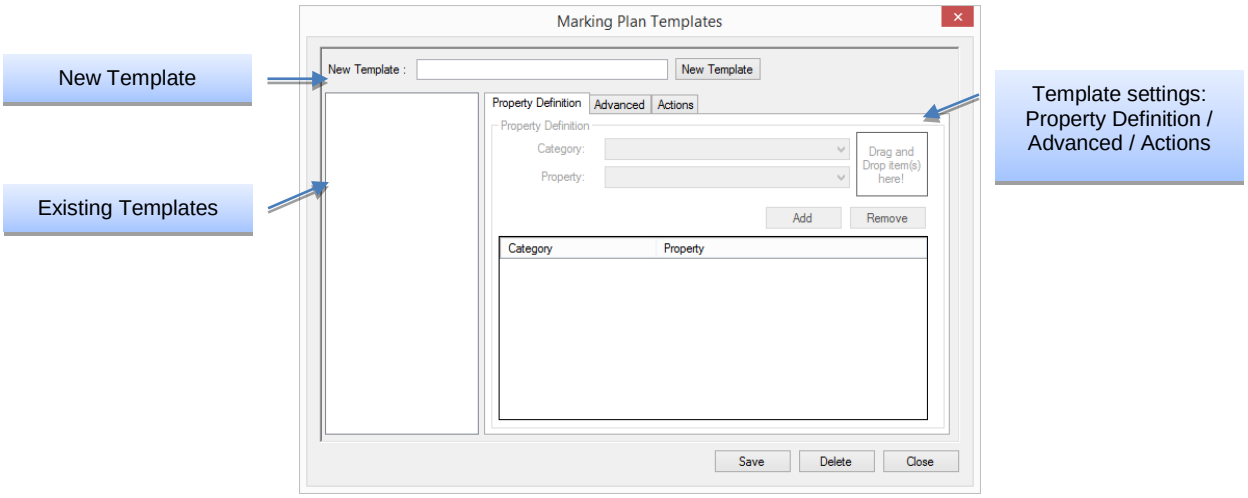
Dynamic Labeller visually identifies the main properties of the 3D items within a model, without having to click on the items to view their properties. The images that Dynamic Labeller produces can be saved, and used to relay important information about the model, such as where particular items are located in the model and their codes, while coordinating design projects.



Dynamic Labeller is a template based plugin which can be accessed from the 'General Configuration' tab in the iConstruct Panel. It also can be accessed from the newly introduced "iConstruct 2015 Tools" panel in the Navisworks ribbon.



Running either of these options will provide access to the Dynamic Labeller Templates window.



A- New Template: input the name of the new Dynamic Labeller template

B- Existing Templates List: list of all exisiting templates, the user can select each template to edit settings or customize it by double clicking on an item

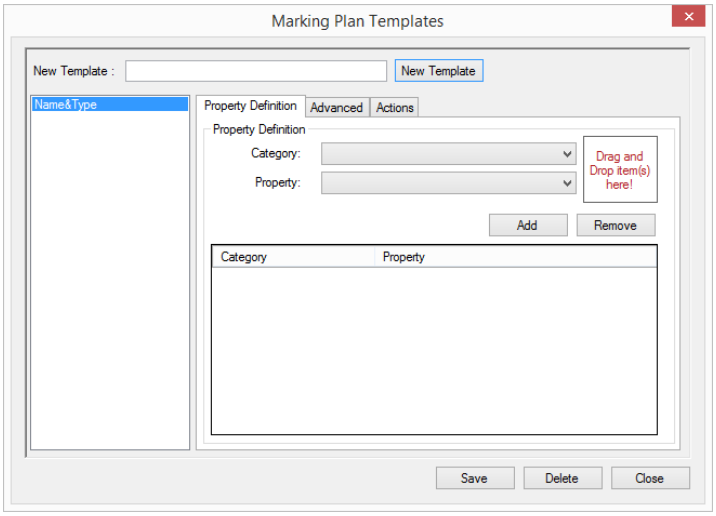
C- Template Settings:

- Property Definition: nominate a category / property list to be displayed for the selected items in the model
- Advanced: settings for font family, size, colour and tag-line can be found here

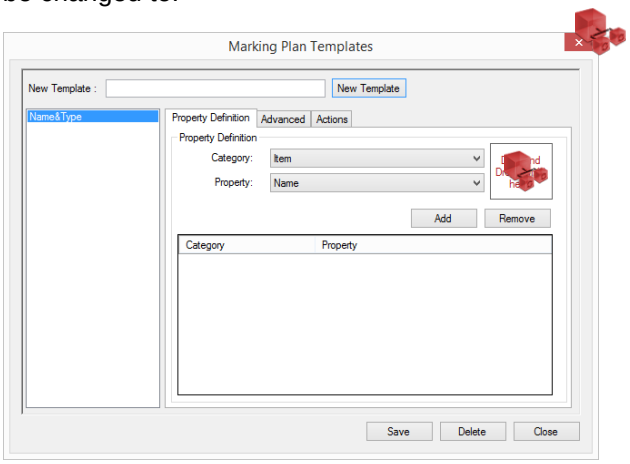
- Actions: in this tab configure additional actions that the Dynamic Labeller module should take when running each template

34.2 Defining Template

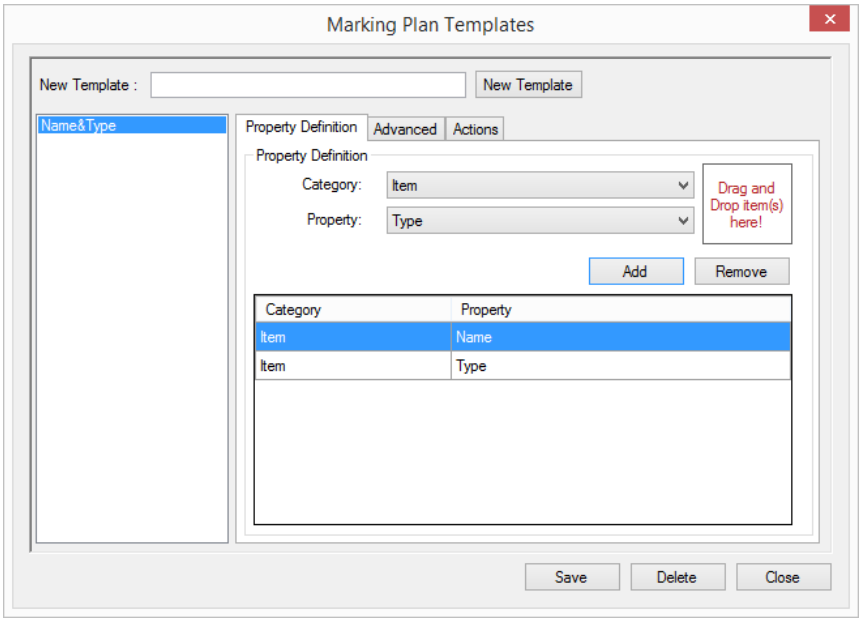
To define a new template type the template name in the ‘New Template’ text box and press ‘New Template’ button.



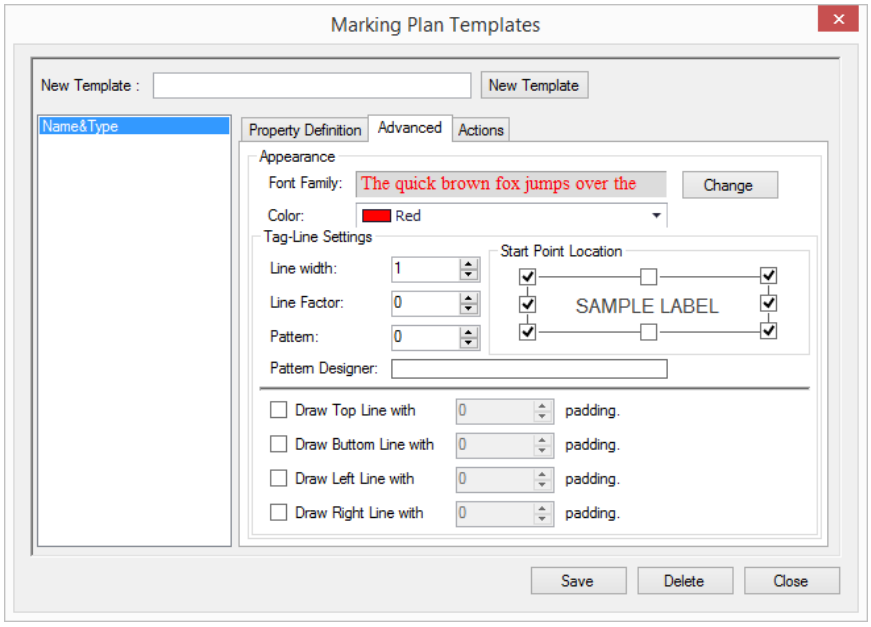
The next step is to nominate properties to be marked when running the template. Drag and drop at least one item from the model into the box with the red “Drag and Drop item(s) here!” text. When the Dynamic Labeller Template window is open, items in the model can be selected and when dragging items the mouse icon will be changed to:



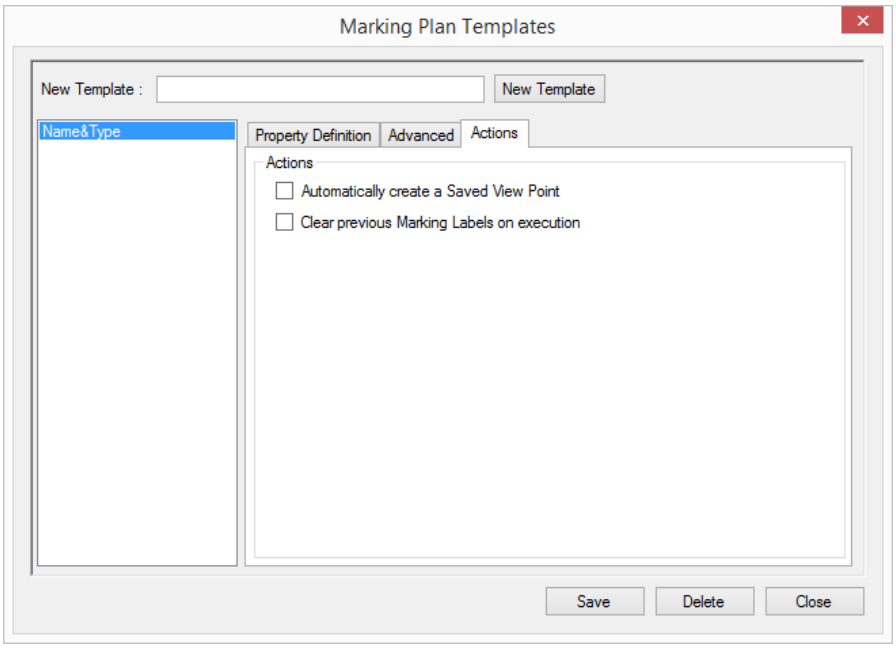
Now select the Category / Property that is to be displayed from the list, and then press ‘Add’. Many items can be selected, however if too many items are chosen, they might not fit in to the screen properly.



After nominating the list of properties, press the 'Save' button. Changes to the font, colour and line alignment settings can be made in the advanced tab:



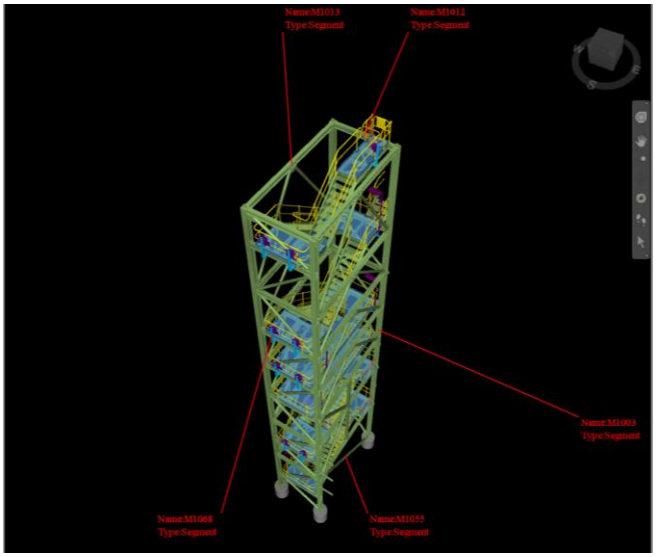
The Dynamic Labeller plugin also has the option to create 'Saved Viewpoints' automatically, which can be found in the 'Actions' tab:



34.3 Running a Dynamic Labeller Template

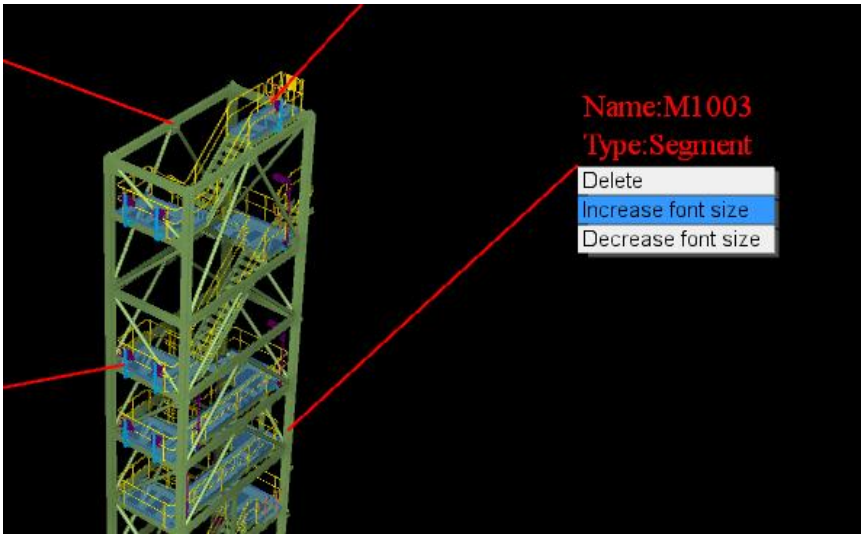
After saving a template in the configuration winow a new Dynamic Labeller icon will appear in the 'Dynamic Labeller' tab of the iConstruct panel. Also a new command will be added to the Dynamic Labeller section of the iConstruct 2015 Tools ribbon panel on the Navisworks toolbar:

To run each template select at least one item in the model. Then click on the template icon:



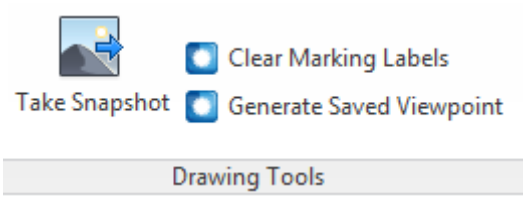
The Dynamic Labeller module positions each label on the screen automatically, however the position of each label can be changed by drag-dropping each label to a nominated location.

The font size of each label can be inclreased or decreased individually by selecting the menu item when hovering the mouse icon over a label:



34.4 Drawing Tools

The Dynamic Labeller tool uses the iConstruct Rendering Engine introduced in this version which is used in multiple modules. This engine comes with a set of commands that are accessible from 'Drawing Tools' in iConstruct 2015 Tools panel in the Navisworks ribbon:



A- Take Snapshot: use this command to take a snapshot from the existing model containing all existing labels

B- Clear Marking Labels: deletes existing marking labels

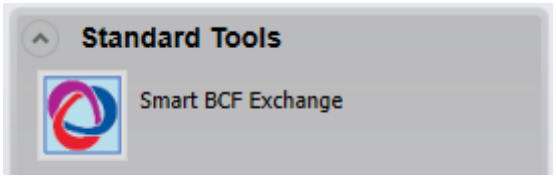
C- Generate Saved Viewpoint: automated marking labels will not be saved in the model, by using this command a Navisworks saved viewpoint can be saved with the userr nwd or nwf files.

35 Smart BCF Exchange

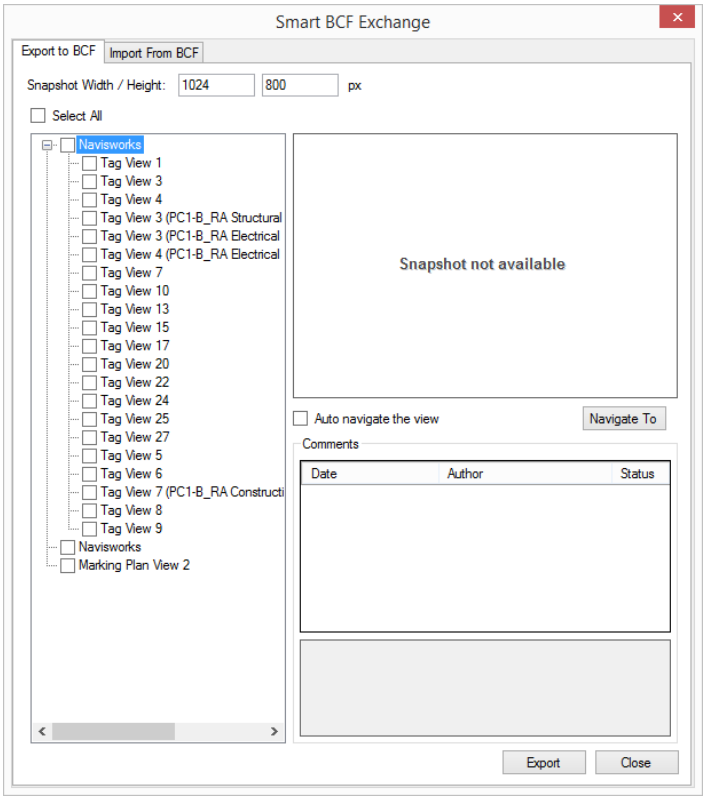
Another new feature in iConstruct 2015 is BCF Exchange plugin. The buildingSMART organization developed an XML schema, called BCF, to encode messages that inform a software package of issues found in the BIM model by another software tool. The implication is that only those issues and not the entire BIM need to be communicated between software and that this simple capability will enable a degree of collaboration. This XML schema and capability have already been built into several software package including, Tekla Structures, Solibri Model Checker and DDS Architecture.[4]

35.1 Abstract

The BCF Plugin in iConstruct allows the import / export of BCF files into the Navisworks model. This plugin is accessible from the Standard Tools:



Smart BCF Exchange can import and export .bcfzip files:



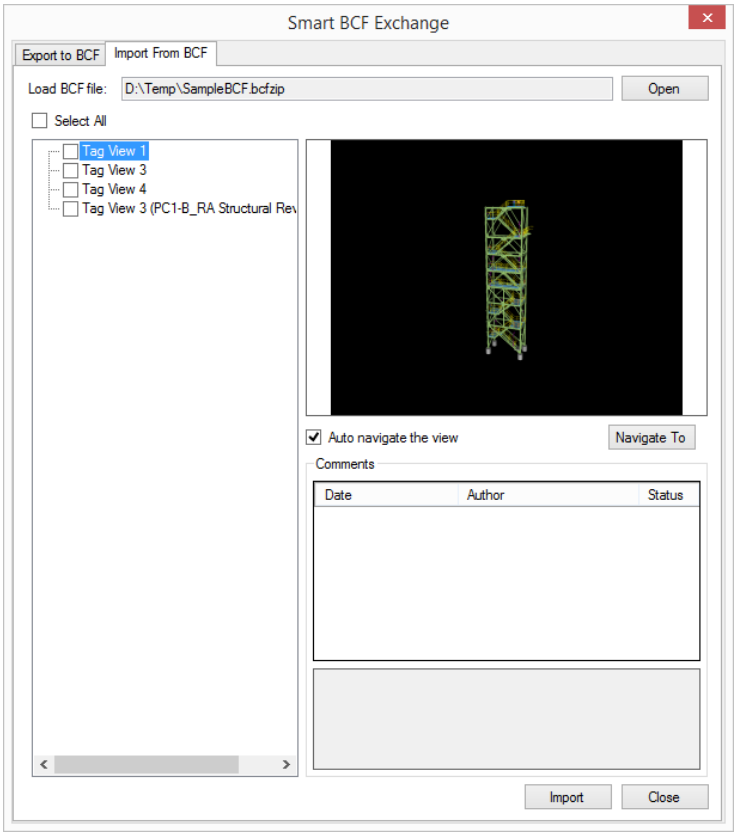
35.2 Export BCF File

In the “export to BCF” tab all existing Navisworks viewpoints are listed in the same structure as it is defined in the ‘Saved Viewpoint’ panel in Navisworks. As many viewpoints as required can be selected for export. Also the size of the image to be generated can be defined for each viewpoint. After selecting viewpoints and defining the image size press the ‘Export’ button, input a file name when requested and the output BCF file will be generated, including all viewpoints and comments, along with a snapshot of the model for each viewpoint.

Import BCF File

[4] Read more about BCF standard here: http://www.buildingsmart.org/standards/bcf

To import a BCF File open the ‘Import from BCF’ tab in the Smart BCF Exchange window, then open the BCF file by clicking on the ‘Open’ button.



All of the exisitng viewpoints can be found in the list on the left hand side. When clicking on each viewpoint, a saved snapshot of the viewpoint can be seen in the BCF file. Also there is an option to navigate the model to the same view as the BCF viewpoint by pressing the “Navigate To” button.

To import viewpoints into the Navisworks saved viewpoint list, select the viewpoints from the list and then press Import. This will generate saved viewpoints, complete with all existing comments for each BCF viewpoint in the .bcfzip file, in Navisworks.

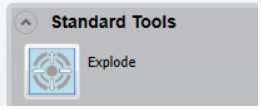
36 Explode

New for 2015 is the ‘Explode’ tool which can be used to assist with the examination of complex parts such as mechanical items.

36.1 Abstract

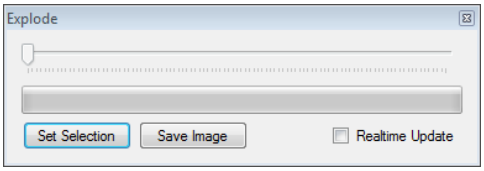
Explode is used in instances where there is many small items of geometry in a closed space. The user traditionally has sectioning, visibility and transparency at their disposal to get a clearer view of the model. Explode takes this a step further by expanding out the individual parts from the center of the selected objects.

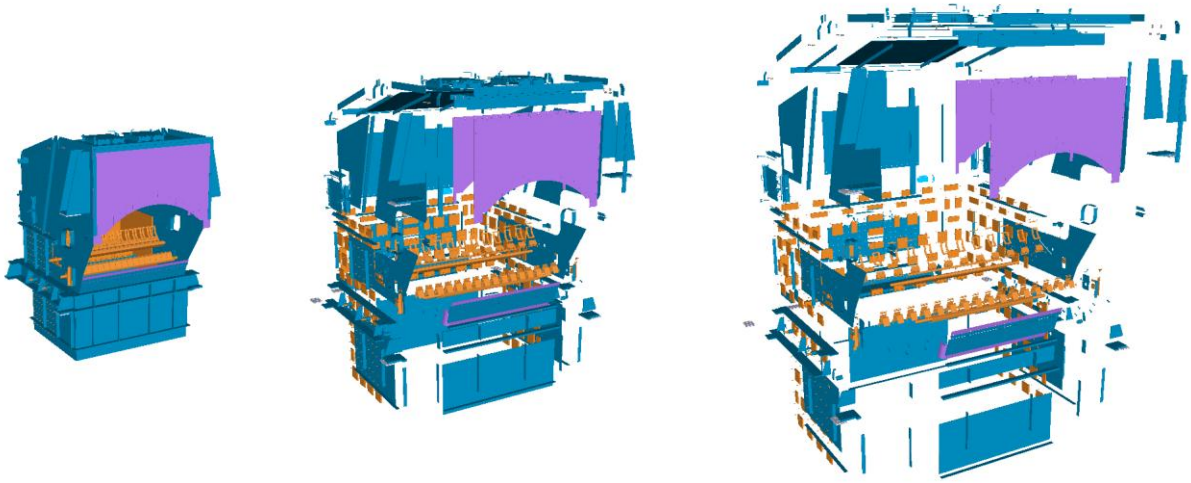
To start ‘Explode’, click the ‘Explode’ icon in ‘Standard Tools’



When the ‘Explode’ panel appears, make a selection in the model and click the ‘Set Selection’ button. The slider will be enabled and can be moved to the right to expand the selection, and left to reduce it. Images can be saved out using ‘Save Image’ and most other iConstruct functionality can be used while in this mode. Check ‘Realtime Update’ to have the view update as the user is moving the slidebar, or alternatively leave unchecked to have the view update when the user lets go of the mouse button on the slidebar.

If the user wishes the exploded parts to stay in place, hold the left shift button when closing the panel, otherwise the parts will be reset. Note that the parts can still be returned manually by highlighting the parts and resetting the transform using the Navisworks context menu.





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37 Licensing Acknowledgements

37.1 PDFSharp (used in Open File)

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37.2 iTextSharp 4.1.6 (LPGL) (used in Open File)

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37.3 LaMarvin ColorPicker (Colour picker control)

http://www.codeproject.com/info/cpol10.aspx

37.4 The xBIM Toolkit (IFC Exporter)

https://xbim.codeplex.com/license